SEVENTEENTH ANNUAL MEETING

TRANSACTIONS OF THE

of

Western Surgical and Gynecological Association

at

Seventeenth Annual Meeting, held at
St. Louis, Missouri, December 30 and 31, 1907

MINNEAPOLIS
PRESS OF THE JOURNAL-LANCET
1908

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OFFICERS AND EXECUTIVE COUNCIL, 1908

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3763

EX-PRESIDENTS AND MEETING PLACES

PRESIDENT	PLACE	YEAR
S. S. Todd*	Topeka	1891
Milo B. Ward*	Kansas City	1892
Milo B. Ward*	Des Moines	1893
Lewis Schooler	Omaha	1894
John E. Summers, Jr.	Kansas City	1895
Thomas J. Beattie	Topeka	1896
Joseph Eastman*	Denver	1897
David S. Fairchild	Omaha	1898
Homer C. Crowell	Des Moines	1899
O. Beverley Campbell	Minneapolis	1900
August F. Jonas	Chicago	1901
James E. Moore	St. Joseph	1902
Alex. Hugh Ferguson	Denver	1903
Charles H. Mayo	Milwaukee	1904
Harry D. Niles	Kansas City	1905
Malcom L. Harris	Salt Lake City	1906
Charles W. Oviatt	St. Louis	1907

*Deceased.

The Western Surgical and Gynecological Association does not hold itself responsible for, or necessarily endorse, any of the papers printed herein.

ARTHUR T. MANN, Secretary-Treas.

CONTENTS

	PAGE
Officers and Executive Council for 1908	5
Ex-Presidents and Meeting Places	7
Transactions	9

PAPERS

President's Address: Some Thoughts on Surgery as a Profession. Charles W. Oviatt, Oshkosh, Wis.	19
The Removal of Gall-Stones in the Common Duct Through the Lesser Omentum. Malcolm L. Harris, Chicago, Illinois	31
A Common-Duct Stone Larger Than Any Which the Author Finds Recorded. William Bartlett, St. Louis, Missouri	39
The Pathological Gall-Bladder. Byron B. Davis, Omaha, Nebraska	41
The Differential Diagnosis of Duodenal Ulcer and Gall-Stones. W. D. Haines, Cincinnati, Ohio	57
Peptic Ulcer of the Jejunum. F. Gregory Connell, Oshkosh, Wisconsin	63
Acquired Atresia of the Common Duct, Due to a Gall-Stone. John C. Hancock, Dubuque, Iowa	47
Obstructions of the Common Bile-Duct, With Report of a Case in Which Were Performed (a) Cholecystostomy, (b) Partial Gastrectomy With Posterior Gastro-intestinal Anastomosis, (c) Cholecystenterostomy and Entero-Anastomosis. Archibald A. Kerr, Salt Lake City, Utah	81
The Use of Harrington's Solution in the Treatment of Suppurative Inflammations of the Knee-Joint, With Report of an Illustrative Case. John E. Summers, Omaha, Nebraska	87
Removal of the Whole or Part of the Humerus. St. Elmo M. Sala, Rock Island, Illinois	93
The Surgical Treatment of Bunion. Charles H. Mayo, Rochester, Minnesota	99
The Early Restoration of Function After Excision of the Elbow-Joint in Tuberculosis Cases. Gilbert Geoffrey Cottam, Rock Rapids, Iowa	105
Arthrodesis and Tendon Transference in Paralytic Club Feet. John Prentiss Lord, Omaha, Nebraska	109

PAGE

The Surgical Treatment of Hydrocephalus. William Jepson, Sioux City, Iowa 121

Anesthesia Fatalities in Iowa. Lawrence W. Littig, Iowa City, Iowa 133

The Abdominal Incision. Clifford U. Collins, Peoria, Illinois 161

The Significance of Tenderness in Locating Lesions of the Viscera. Thomas C. Witherspoon, Butte, Montana 175

An Experimental Study in the Etiology of Cancer. Arthur E. Hertzler, Kansas City, Missouri 189

Preparatory and Post-Operative Treatment. James E. Moore, Minneapolis, Minnesota 197

Primary Sarcoma of the Liver. Van Buren Knott, Sioux City, Iowa 215

Torsion of the Omentum. William D. Grant, Denver, Colorado 253

The Confusion of Appendicitis With Other Diseases of the Female Pelvis. Arthur E. Benjamin, Minneapolis, Minnesota 259

Intestinal Obstruction: Exploration. Benjamin Merrill Ricketts, Cincinnati, Ohio 269

Hernia of the Appendix, Complicated With Appendicitis. David W. Basham, Wichita, Kansas 273

The Appendix as a Hernial Content. Charles S. James, Centerville, Iowa 281

Lymphatic and Portal Infections Following Appendicitis, With Report of a Case. Roland Hill, St. Louis, Missouri 287

Synchronous Intra-Uterine and Extra-Uterine Pregnancy. David C. Brockman, Ottumwa, Iowa 303

The Diagnosis and Treatment of Extra-Uterine Pregnancy. George C. Barton, Minneapolis, Minnesota .. 307

Sexual Perversion as an Accompaniment of Prostatic Hypertrophy. James F. Percy, Galesburg, Illinois ... 325

Executive Session

December 30—First Day—Morning Session

The Association met at the Southern Hotel, at 9:30 A. M., and was called to order by the President, Dr. Charles W. Oviatt, of Oshkosh, Wis.

Dr. John Young Brown, of St. Louis, Mo., was introduced, and delivered the following

ADDRESS OF WELCOME

Mr. President and Gentlemen of the Association:

I esteem it an honor to be permitted to appear before you as the representative of the medical profession of St. Louis, and welcome you to our city. Your Association is one of which the medical profession of the West, may feel proud. During the seventeen years of your existence, the contributions by your members to surgical literature have been of the highest scientific value, some of them epoch-making in character. To-day there are few books on surgery in which no mention is made of the many branches of our art, and particularly is this true of the surgery of the stomach, the gall-bladder, and the intestine. The influence which the Mayos have exerted in perfecting the diagnosis and surgical treatment of diseases of the gall-bladder and stomach is recognized the world over. The same may be said of the early and brilliant work of Murphy in the field of intestinal surgery. Numerous other instances could be cited of the splendid influence your Association has exercised and developed

in the progress of modern surgery, but I know you have a long and important program, and my function here to-day is simply to welcome you heartily, and not to weary you. Again, in behalf of the medical profession of St. Louis, I bid you a hearty welcome to our city. (Applause.)

RESPONSE BY DR. BOWERS

Dr. Charles E. Bowers, of Wichita, Kansas, was called upon to respond to the Address of Welcome. He said:

Mr. President and Fellow Members: I do not think the Association made a mistake in selecting this city as its place of meeting. Those who are acquainted with the spirit of St. Louis certainly knew that this would be a good place in which to meet. The members of the medical profession of this city will undoubtedly attend our sessions and take an active interest and part in our deliberations. I think I voice the sentiments of the members of the Association when I say that we all enjoy meeting here, and we thank the profession of St. Louis for this courtesy. (Applause.)

At this juncture, the First Vice-President, Dr. S. C. Baldwin, took the chair, and President Oviatt delivered his address. At the conclusion of the address, the reading of papers was proceeded with.

Dr. Willard Bartlett, of St. Louis, Mo., read a paper entitled "The Largest Common-duct Stone on Record."

As there were other papers on diseases of the gall-bladder to follow, Dr. Cottam moved that all of these papers be read and then a joint discussion on them be had, which motion was duly seconded and carried.

Dr. B. B. Davis, of Omaha, Neb., read a paper on the "Pathological Gall-Bladder."

Dr. W. D. Haines, of Cincinnati, Ohio, followed with a paper on "The Differential Diagnosis of Duodenal Ulcer and Gall-stones."

Dr. F. Gregory Connell, of Oshkosh, Wis., read a paper on "Peptic Ulcer of the Jejunum, with Report of a Case."

Dr. John C. Hancock, of Dubuque, Iowa, read a paper entitled "Acquired Atresia of the Common Duct due to a Gall-stone."

These papers were discussed jointly by Drs. Mayo, Wallace, Summers, Moore, Morfit, and, in closing, by Drs. Davis, Haines, and Hancock.

Dr. J. E. Summers, of Omaha, Neb., read a paper entitled "The Use of Harrington's Solution in the Treatment of Suppurative Inflammation of the Knee-joint, with Report of an Illustrated Case."

Discussed by Drs. Mayo, Witherspoon, and, in closing, by the essayist.

Dr. M. L. Harris, of Chicago, read a paper entitled "The Removal of Common-duct Stones through the Lesser Omentum."

Dr. E. M. Sala, of Rock Island, Ill., read a paper entitled "Removal of the Whole or a Part of the Humerus." This paper was discussed by Drs. Hill and Haines.

Dr. Chas. H. Mayo, of Rochester, Minn., read a paper entitled "Surgical Treatment of Hallux Valgus," which was discussed by Drs. Baldwin, Hill, and, in closing, by the essayist.

On motion, the Association adjourned until 2 P.M.

First Day—Afternoon Session

The Association re-assembled at 2 P. M., with the President in the chair.

Dr. G. G. Cottam, of Rock Rapids, Iowa, read a paper on "The Early Restoration of Function after Excision of the Elbow-joint."

Dr. L. W. Littig, of Iowa City, Iowa, followed with a paper on "Anesthesia Fatalities in Iowa." The paper was discussed by Drs. Brockman, Byford, James, Davis, Mayo, Grant, Minahan, Moore, Jackson, Dunsmoor, Harris, and the discussion was closed by Dr. Littig.

Dr. John P. Lord, of Omaha, Neb., read a paper entitled "Arthrodesis and Tendon Transference in Paralytic Club-foot," which was discussed by Dr. Baldwin and, in closing, by the essayist.

Dr. Wm. Jepson, of Sioux City, Iowa, read a paper on "Hydrocephalus: Its Surgical Management." The paper was discussed by Drs. Griffith, Mayo, and Harris.

Dr. Clifford U. Collins, of Peoria, Ill., read a paper on "The Abdominal Incision." The paper was discussed by Drs. Grant, Byford, Lord, Wallace, Fairchild, Elbrecht, and, in closing, by the essayist.

On motion, the Association adjourned until Tuesday, 9 A. M.

DECEMBER 31—SECOND DAY—MORNING SESSION

The Association met at 9 A. M., and was called to order by the President.

Dr. T. C. Witherspoon, of Butte, Montana, read a paper entitled "The Significance of Abdominal Tenderness in Locating Lesions of Viscera." The paper was discussed by Drs. Byford, Hertzler, Bowers, and, in closing, by Dr. Witherspoon.

Dr. A. E. Hertzler, of Kansas City, Mo., read a paper entitled "The Clinical Aspects of Some Recent Cancer Research," which was discussed by Drs. Mayo, Harris, and, in closing, by the essayist.

Dr. James E. Moore, of Minneapolis, Minn., read a paper on "Preparatory and Post-operative Treatment," which was discussed by Drs. Bowers, Jackson, Grant, Dunsmoor, Barton, Mayo, Bartlett, Hertzler, and, in closing, by the essayist.

Dr. Van Buren Knott, of Sioux City, Iowa, read a paper entitled "Primary Sarcoma of the Liver." The paper was discussed by Drs. Mayo, Percy, Summers, Hill, Haines, and, in closing, by Dr. Knott.

Dr. W. W. Grant, of Denver, Colo., read a paper entitled "Torsion of the Omentum," which was discussed by Dr. Griffith and, in closing, by Dr. Grant.

Dr. M. L. Harris moved that the Secretary read the report of the Executive Council at this time. Carried.

Secretary Mann read the following:

REPORT OF THE EXECUTIVE COUNCIL

St. Louis, Mo., December 31, 1907.

There were present at the meeting of the Executive Council Drs. Harris, Oviatt, Mayo, and Wallace.

In the absence of Drs. Niles and Freeman, Drs. Fairchild and Percy were appointed to fill their places at this meeting.

The minutes of the previous meeting were approved, with the correction of one typographical error, making it read $345.00 for the balance in the treasury.

The following are recommended for membership:

Herman Tuholske	St. Louis, Mo.
John Young Brown	St. Louis, Mo.
Clarence M. Nicholson	St. Louis, Mo.
Frank J. Lutz	St. Louis, Mo.
H. S. Crossen	St. Louis, Mo.
L. A. Todd	St. Joseph, Mo.
Wm. Hessert	Chicago, Ill.
J. L. Crawford	Cedar Rapids, Iowa.
Wm. H. Magie	Duluth, Minn.
H. P. Ritchie	St. Paul, Minn.
E. S. Judd	Rochester, Minn.
DeWitt S. Fairchild	Clinton, Iowa.
Charles E. Paddock	Chicago, Ill.

On motion, the Secretary-Treasurer was directed

to pay for the badges and hereafter to procure them for the Association.

The following are recommended as officers for the ensuing year:

President .....W. W. Grant, Denver, Colo.
First Vice-President Willard Bartlett, St. Louis, Mo.
Second Vice-President Harry A. Sifton, Milwaukee
Secretary-Treasurer .....
Arthur T. Mann, Minneapolis, Minn.
Executive Council .....

C. H. Mayo, to succeed himself, and J. F. Percy to fill the remaining vacancy.

Minneapolis was recommended as the next place of meeting; time, December 29 and 30 (Tuesday and Wednesday), 1908, and Arthur T. Mann as Chairman of the Committee of Arrangements.

On motion, $100.00 was appropriated as the usual honorarium of the Secretary.

The Treasurer's Report was approved, and is as follows:

TREASURER'S REPORT

Receipts

Balance in treasury, August 30, 1906.....	$345.01
Fees and dues for two years, received during the sixteen months since the last meeting.....	1,552.00
From visitors to the banquet, St. Louis.....	15.00
For transactions	9.50
Total $1,921.51	

Disbursements

Paid toward Salt Lake City banquet, 1906.....	$75.00
Paid toward the St. Louis banquet, 1907.....	235.00
Honorarium to the Secretary-Treasurer, 1906-7.....	100.00
Honorarium to the Secretary-Treasurer, 1907-8.....	100.00
Printing and mailing transactions.....	432.05
Wm. Whitford for reporting Salt Lake City meeting..	171.30
Postage, express, etc.....	20.52
Refund on excessive check.....	2.75

Printing and stationery	33.00
Badges	16.40
Total	$1,186.02
Balance	$735.49

Dr. J. N. Jackson moved that the report of the Executive Council be accepted and adopted as read. The motion was seconded and carried.

President Oviatt appointed Dr. Charles H. Mayo to escort the newly-elected President to the platform.

The President thanked the members for their kind and courteous treatment, which had assisted him so much in presiding over the deliberations of the Association, after which he introduced his successor, Dr. W. W. Grant, of Denver, who said:

I assure you that it gives me unalloyed pleasure to accept this mark of your confidence and esteem, and I wish to thank you very cordially.

Some ten years ago, I remember very distinctly when we had to hunt up members for this Association in trying to put it on a substantial footing. It has been a source of pleasure to all of its early members, I am sure, that of late years we have the best surgeons in our Western country seeking admission to this Association. That is to me the best evidence that we have progressed on the right lines and in the right direction, and that our future is no longer a question of debate, but is assured.

I shall rely on your good-will and your co-operation to make the Minneapolis meeting a success. I hope to see even a larger meeting than this most excellent one held here. (Applause.)

Dr. A. E. Benjamin, of Minneapolis, Minn., read a paper entitled "The Association of Appendicitis with Other Diseases in the Female Pelvis."

On motion, the Association adjourned until 2 P.M.

Second Day—Afternoon Session

The Association reassembled at 2 P. M., and was called to order by the President.

Dr. D. W. Basham, of Wichita, Kan., read a paper entitled "Hernia of the Appendix Complicated with Appendicitis."

Dr. Chas. S. James, of Centerville, Iowa, read a paper on "The Appendix as a Femoral Hernia Content."

Dr. Roland, of St. Louis, Mo., read a paper on "Portal and Lymphatic Infections Following Appendicitis."

These papers were discussed jointly by Drs. Lord, Bartlett, Griffith, Percy, Morfit, and Grant.

Dr. D. C. Brockman, of Ottumwa, Iowa, read a paper entitled "Extra- and Intra-uterine Pregnancy of Five Months, with Operation and Death."

Dr. Geo. C. Barton, of Minneapolis, Minn., read a paper on "Diagnosis and Treatment of Extra-uterine Pregnancy, with Report of an Interesting Case."

These two papers were discussed by Drs. Collins, Basham, Eyster, Beede, Stokes, Frick, Elbrecht, Morfit, Grant, Haines, Harris, Brockman, and the discussion was closed by Dr. Barton.

Dr. J. F. Percy, of Galesburg, Ill., read a paper entitled "Sexual Perversion as an Accompaniment of Prostatic Hypertrophy." The paper was discussed by Drs. Stokes, Lewis, and, in closing, by the essayist.

After the reading of all the papers on the program, Dr. John P. Lord made the following motion:

I move that we express in our minutes our sense of appreciation of the treatment we have received through the Committee of Arrangements and the St. Louis profession. They have made admirable arrangements for us, and we have been courteously and cordially welcomed and entertained by them.

This motion was seconded by several and carried unanimously.

Before declaring the Association adjourned, President Grant said:

I hope you will permit me once more to say that I shall try at least to approach the excellent management of my predecessor, Dr. Oviatt, in the next year's meeting of this Association. Certainly, we have had a most delightful occasion and a very successful meeting. We have had a good attendance at all times, and it would not look well if the Northwest did not preserve its usual character and reputation one year from this time in the city of Minneapolis, which Dr. Moore vouches for as being most delightful, even at Christmas time, and I hope on that occasion to meet you all.

The convention will now stand adjourned.

President's Address

SOME THOUGHTS ON SURGERY AS A PROFESSION

CHARLES W. OVIATT, M. D.,

OSHKOSH, WISCONSIN

I wish first to express my appreciation of the great honor you have shown me. To be selected to preside at a meeting of this body of representative surgeons, is an honor for which I feel deeply grateful.

My address upon this occasion does not deal with any concrete surgical problem, but consists, rather, of a few thoughts bearing on the practice of surgery as a profession. I cannot hope to enlighten you from the chronicles of the past, as the history of surgery is familiar to you all; nor can I add to your knowledge of the status of the work being done to-day. I shall simply give expression to impressions that naturally come to one who has spent the most active years of his life in the work, and who has now reached a period where the shadows are beginning to fall the other way.

Looking backward, we find that the science of surgery is but a century old. Before the year 1800 but few discoveries were made that marked any distinct advance. The ligation of blood-vessels for hemorrhage, by Pare, in 1552; the discovery of the circulation of the blood, by Harvey, in 1628; and the discovery of the capillary circulation, by Malpighi, in 1661, were in-

deed most important stepping-stones to future progress. In the following century the studies of John Hunter in the healing of wounds and the ligation of blood-vessels in their continuity, marked another epoch; but, aside from these, no great discoveries were made from the time of Hyppocrates down to the beginning of the nineteenth century. Before this time the practice of surgery was in the hands of illiterate barber-surgeons and quacks. In the year 1800, however, after many failures and much bitter contention, The Royal College of Surgeons obtained a charter from Parliament which placed surgery upon a secure foundation. (Dennis' History and Development of Surgery During the Past Century.)

The evolution of surgery during the past century has kept pace with the development of science along other lines, wonderful as this has been; and we have reason for just pride in the contributions made by the surgeons of our own land during this era of great progress. If, however, none other had been made than the discovery of the use of ether in producing anesthesia, America would still be entitled to the highest mark of honor. No discovery yet made in surgery has been so great a boon to suffering humanity. Every young physician should avail himself of the opportunity when in Boston to visit the Massachusetts General Hospital, and ask to be conducted to the little amphitheatre at the top of the old building where the first operation was performed under ether administered by Morton. This room has been left practically unchanged, and there may be seen the original apparatus used in its administration. To me this seems a sacred place.

The advent of antiseptic and aseptic measures marked an era but little less important than that of the introduction of anesthesia. Those of us who began our professional studies a quarter of a century ago,

look back upon some interesting events. How little indeed does the graduate of to-day know of the uncertain and often direful results of the surgery of pre-antiseptic days! The result of a given operation was unknown and unknowable. Whether to expect healing with the formation of so-called laudable pus we knew not; and whether erysipelas, pyemia, or gangrene would follow, could not be determined. All this is changed, and these terrible wound-complications of former days are merely facts of historic interest. While Lister should receive full credit for bringing about this revolution in surgery, we should not forget the names of Pasteur and Tyndall. Without the work of these great scientists, Lister could not have given us the principles which have led up to the wonderful achievements of to-day. History bears out the oft-repeated statement that there has been more progress in surgery in the twenty-five years following the advent of antisepsis than was made in the preceding twenty-five centuries.

With the establishment of a perfected aseptic technic, it seemed that the acme of surgical skill had been reached; and yet, in the light of the discoveries coming to us daily as the latest whisper of science, we can prophesy greater achievements for the future than are yet dreamed of. The border-line cases of yesterday become the settled surgical problems of to-day; and the border-line cases of to-day will, many of them, by modern aggressive methods be settled in the same manner to-morrow. It would indeed be rash to attempt to place a limit to the future of surgery.

We have reason to be thankful that it was our fortune to come onto the stage of activity in this age of wonderful progress. Our opportunities have been great, but we should not be unmindful of the magnitude of our heritage. Individually, most of us can hope to do but little toward paying this great debt; collectively, as organized surgical associations like this, it seems

to me we may do much by helping to mould the surgeon of the future. We can lend our aid toward the elevation of the standard of the surgeon's qualifications.

The ambitious medical student does not usually get far into his college work before he aspires to become a surgeon. He sees in the surgical clinics more definite and striking results than are discernible in other branches. Without being able to judge of his own relative fitness or whether he possesses the special aptitude so essential to success, he decides to become a surgeon. This thought was so tersely brought out by Dr. Lewis Bosher in the President's Address before The Southern Surgical and Gynecological Association, in 1905, that I quote as follows:

> To the recent graduate in medicine, no department of his chosen profession appeals with the same force as does surgery. While a student, he has been impressed with the brilliancy of the results secured by his professors before his very eyes; at the meetings of the alumni the clinics in surgery have been crowded, while those in other branches have been slimly attended or else as a compliment to the individual holding them, rather than from actual interest in the subject; in most medical colleges the prominence of the professors of surgery in all faculty affairs is well known; while, considering the more material side of the question, he has little trouble in ascertaining that it is no unusual thing for a surgeon to secure for a single operation, occupying but an hour or two, or even less, a fee greater than the entire collections of the general practitioner for a week's steady work, with broken rest and cares and responsibilities innumerable. On leaving college, if he enters into hospital service, these facts are impressed on him with even greater force, and, later on, having himself entered the ranks of struggling practitioners, the same lessons are borne in upon him with increasing emphasis.
>
> Little wonder is it, then, that so many young medical men, bearing all these things in mind, decide that they, too, will enter this alluring field, where, they believe, they will effect such marvelous results, in brilliant cures, in abundant pecuniary reward, in the homage of their fellow men, and, if moved by even higher motives, in the actual good they may do suffering humanity.
>
> These young men are all too prone to see but one side of

the picture and to overlook the fact that here, as in all other pursuits, success comes only as the reward of special fitness. —(Transactions of The Southern Surgical Association, 1906.)

There will always be room for the young surgeon who, fitted by nature for the work, takes the time and opportunity to properly prepare himself. There is more good surgery being done to-day than ever before, and there are more good surgeons being educated to do the work. If, however, the surgeon of the future is to hold the high and honorable position our leaders have held in the past, there must be established some standard of qualification that will limit the number who assume to do surgery.

That much which passes under the name of surgery is being done by ill-trained, incompetent men, will not be denied. What standard, then, should be established, and what requirement should be made, before one should be permitted to do surgery? In his address as chairman of the Surgical Section at the Portland meeting of the American Medical Association, Dr. Maurice H. Richardson deals with this subject in such a forceful, clear-cut way that I take the liberty to quote him at some length:

> The burden of the following remarks is that those only should practice surgery who, by education in the laboratory, in the dissecting-room, by the bedside, and at the operating-table, are qualified, first, to make reasonably correct deductions from subjective and objective signs; secondly, to give sound advice for or against operations; thirdly, to perform operations skillfully and quickly; and, fourthly, to conduct wisely the after-treatment.
>
> The task before me is a serious criticism of what is going on in every community. I do not single out any community or any man. There is in my mind no doubt whatever that surgery is being practiced by those who are incompetent to practice it—by those whose education is imperfect, who lack natural aptitude, whose environment is such that they never can gain that personal experience which alone will really fit them for what surgery means to-day. They are unable to make correct deductions from histories; to predict probable events;

to perform operations skillfully, or to manage the after-treatment.

All surgeons are liable to error, not only in diagnosis, but in the performance of operations based on the diagnosis. Such errors must always be expected, and included in the contingencies of the practice of medicine and surgery. Doubtless, many of my hearers can recall cases of their own in which useless, or worse than useless, operations have been performed. If, however, serious operations are in the hands of men of large experience, such errors will be reduced to a minimum.

Many physicians send patients for diagnosis, and opinion as to the advisability of operation, without telling the consultant that they themselves are to perform the operation. The diagnosis is made and the operation perhaps recommended, when it appears that the operation is to be in incompetent hands. His advice should be conditional that it be carried out only by the competent. Many operations, like the removal of the vermiform appendix in the period of health, the removal of fibroids which are not seriously offending, the removal of gall-stones that are not causing symptoms, are operations of choice rather than of necessity; they are operations which should never be advised unless they are to be performed by men of the greatest skill. Furthermore, many emergency operations, such as the removal of an inflamed appendix and other operations for lesions which are not necessarily fatal, should be forbidden, and the patient left to the chances of spontaneous recovery, if the operation proposed is to be performed by an incompetent.

And is not the surgeon, appreciating his own unfitness in spite of years of devotion, in the position to condemn those who lightly take up such burdens without preparation and too often without conscience?

In view of these facts, who should perform surgery? How shall the surgeon be best fitted for these grave duties? As a matter of right and wrong, who shall, in the opinion of the medical profession, advise and perform these responsible acts, and who shall not? Surgical operations should be performed only by those who are educated for that special purpose.

I have no hesitation in saying that the proper fitting of a man for surgical practice requires a much longer experience as student and assistant than the most exacting schools demand. A man should serve four, five, or six years as assistant to an active surgeon. During this period of preparation,

as it were, as much time as possible should be given to observing the work of the masters of surgery throughout the world.—(Jour. of the A. M. A., October 7, 1905.)

While Dr. Richardson's ideal may seem almost utopian, there being so wide a difference between the standard he would erect and the one generally established, we must all agree that, however impossible of attainment under present conditions, such an ideal is none too high and its future realization not too much to hope for.

While there is being done enough poor surgery that is honest and well-intended, there is much being done that is useless, conscienceless, and done for purely commercial ends. This is truly a disagreeable and painful topic, and one that I would gladly pass by, did I not feel that its importance demands some word of condemnation coming through such representative surgical organizations as this.

The spirit of graft that has pervaded our ranks, especially here in the West, is doing much to lower the standard and undermine the morals and ethics of the profession. When fee-splitting and the paying of commissions for surgical work began to be heard of something like a decade ago, it seemed so palpably dishonest and wrong that it was believed that it would soon die out or be at least confined to the few in whom the inherited commercial instinct was so strong that they could not get away from it. But it did not die; on the other hand, it has grown and flourished.

In looking for an explanation for the existence of this evil, I think several factors must be taken into account, among them being certain changes in our social and economic conditions. This is an age of commercialism. We are known to the world as a nation of dollar-chasers where nearly everything that should contribute to right-living is sacrificed to the Moloch of money. The mad rush for wealth which has char-

acterized the business world, has, in a way, induced some medical men, whether rightfully or wrongfully, to adopt the same measures in self-protection. The patient or his friends too often insist on measuring the value of our services with a commercial yard-stick, the price being the chief consideration. In this way the public must come in for its share of the responsibility for existing conditions. The old-time sentiment for the family physician is a thing of the past, and professional services are governed by the law of supply and demand, the same as other commodities. So long as there are people who care so little who operates on them, just so long will there be cheap surgeons, cheap in every respect, to supply the demand. The demand for better physicians and surgeons must come from those who employ their services.

Another source of the graft evil is the existence of low-grade, irregular and stock-company medical schools. In these schools the entrance requirements are not in evidence outside of their catalogues. With no standard of character or ethics, these schools turn out men who have gotten the little learning they possess in the very atmosphere of graft. The existence of these schools seems less excusable when we consider the fact that our better medical colleges rank with the best in the world, and are ample for the needs of all who should enter the profession. The constant aim is to still further elevate the standard and to admit as students only those who give unmistakable evidence of being morally and intellectually fit to become members of the profession.

Enough men of character are entering the field through these schools to insure the upholding of the lofty ideals that have characterized the profession in the past and which are essential to our continued progress. I think, therefore, we may take a hopeful view of the future. The demand for better prepared

physicians will eventually close many of the avenues that are now open to students, greatly to the benefit of all. With the curtailing of the number of students, and the less fierce competition which this will bring, there will be less temptation, less necessity, if you will, on the part of the general practitioner to ask for a division of fees. He will come to see that honest dealing on his part with the patient requiring special skill, will, in the long run, be the best policy. He will make a just, open charge for the services he has rendered, and will not attempt to collect a surreptitious fee through a dishonest surgeon for services he has not rendered and could not render.

Another aid in the elimination of this evil is coming from the people themselves. The public mind is especially active just at this time in combating graft in all forms, and is ready to aid in their destruction. The intelligent portion of the laity are becoming alive to the patent-medicine evil. It is only a question of time when the people will demand that the secular papers which go into our homes shall not contain the vile, disgusting, and suggestive quack advertisements that are found there to-day.

The medical profession, after a long period of imposition that has amounted almost to stupidity on their part, are waking up to the fact that it is time to stop allowing the manufacturing pharmaceutical concerns, through their traveling representatives, to tell them how to practice medicine by means of ready-made proprietary preparations.

A campaign of reform is being instituted against dishonest politicians, financiers, railroad and insurance magnates, showing that their methods will be no longer tolerated. The moral standards set for professional men and men in public life are going to be higher in the future, and with the lime-light of public opinion turned upon the medical and surgical grafter

the evil will cease to exist. Hand in hand with this reform, let us hope that there will come to be established a legal standard of qualification for those who assume to do surgery.

I feel sure that it is the wish of every member of this Association to do all possible to promote the coming of this day and to aid in the uplifting of the noble art of surgery. Our individual effort in this direction must lie largely through the influence we exert over those who are to follow in our immediate footsteps.

First, I think we should advise the "expectant surgeon," in his preparation, to follow as nearly as possible the line of study suggested by Richardson. Then I would add the advice of Senn, namely, "To do general practice for several years, return to laboratory work and surgical anatomy, attend the clinics of different operators, and *never cease to be a physician.* If this advice is followed there will be less unnecessary operating done in the future than has been the case in the past." The young man who enters special work without having had experience as a general practitioner, is seriously handicapped. In this age when we have so frequently to deal with the so-called borderline cases, it is especially well to never cease being a physician.

We would next have the young man assure himself that he is the possessor of a well-developed, healthy, working "surgical conscience." No matter how well qualified he may be, his enthusiasm, in the earlier years of his work, will lead him to do operations that he would refrain from in later life. This will be especially true of malignant disease. He knows that early and thorough radical measures alone hold out hope, and only by repeated unsuccessful efforts will he learn to temper his ambition by the judgment that comes of experience.

Pirogoff, the noted surgeon, suffered from a malignant growth. Bilroth refused to operate or advise operation. In writing of the case to another surgeon friend, he said: "I am not the bold operator whom you knew years ago in Zurich. Before deciding on the necessity of an operation, I always propose to myself this question: Would you permit such an operation as you intend performing upon your patient, to be done on yourself? Years and experience bring in their train a certain degree of hesitancy." This, coming from one who, in his day, was the most brilliant operator on the globe, should be remembered by every surgeon, young or old.

The surgeon should be thoroughly trained in his aseptic technic early in his career so that it may become with him automatic. It is painful to see a man of forty or over attempt to clean up to assist at a surgical operation, unless his training began long years before. When such an emergency arises, it is safest to relegate him to the retractors and keep him there, however much in the way.

The Western Surgical and Gynecological Association has just reason to be proud of what it has accomplished. The influence for good of such an organization cannot but be helpful and elevating. No better surgery is done in the world than in the geographical area from which the membership of this association is drawn. The history of surgery could not be written without enrolling the names of some of our honored members. Let us exercise due care in extending fellowship and lend our every effort to elevate the standard of our cherished art.

THE REMOVAL OF GALL-STONES IN THE COMMON DUCT THROUGH THE LESSER OMENTUM

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The great frequency with which gall-stones are found in some part of the bile-tract has been well known for many years as a result of post-mortem findings, but it is only during the past few years that this frequency has been recognized clinically. It is largely to the operative work of the surgeon that we owe the elucidation of many formerly obscure conditions of the upper abdomen, and their correct assignment, etiologically considered, to what had hitherto been looked upon as innocent inhabitants of the bile-tract.

Of course not all cases of gall-stones present symptoms due to their presence all the time, but it is highly probable that the majority of cases present some symptoms at some time.

These symptoms vary considerably in accordance with the location of the stones, that is, whether located in the gall-bladder, or in the cystic, hepatic, or common bile-ducts. Statistics of operations show, unmistakably, that the seriousness of the case, the difficulties of the operation,and the mortality depend largely on the location of the stones, being least in those cases in which the stones are limited to the gall-bladder, and greatest in those in which stones are lodged in the hepatic or common ducts.

When it is remembered that in the large majority of the cases the stones are limited primarily to the gall-bladder, these latter facts constitute a most eloquent plea for early operation in such cases. The reasons why the mortality is relatively so high in operations on common-duct stones are not hard to understand.

In the first place the frequent interferences in the free escape of the bile give rise to repeated exacerbations of the infection, which is always present, and, secondly, the inflammatory changes extending through the walls of the tracts cause such extensive pericystic and periductal adhesions as, at times, to completely occlude the foramen of Winslow and to bind in an inextricable mass, the ducts, the gall-bladder, the duodenum, the pyloric end of the stomach, the transverse colon, the omentum, and the inferior surface of the liver. Usually, as is well known, these adhesions can be separated or divided so that the duct may be reached by the ordinary route, but one occasionally meets with a case in which the adhesions are so numerous and so dense, and the parts so intimately blended together, that it is practically impossible to separate them so that the duct can be reached without doing great damage to the stomach, the intestine, or the liver. In these cases the gall-bladder, which may contain but a few stones, is frequently found much contracted, its walls greatly thickened, and the whole structure so buried in a mass of adhesions as to preclude access to the ducts.

The gall-bladder and its contained stones may be enucleated without much difficulty, but should the common duct harbor stones it may be impossible to reach them by the usual route. I do not now refer to those cases in which a stone is lodged in the ampulla of Vater and which can be reached by the trans-duodenal route, but to those in which the stone is in the upper part of the duct or movable within the duct, and which, owing to the pyloric end of the stomach hav-

ing been drawn to the right by the adhesions, lies behind this portion of the stomach, as well as the duodenum.

In two cases of this kind which came under my care, after a somewhat prolonged fruitless effort to reach the common duct in the usual way I succeeded in reaching and removing the stones by following a new route through the gastrohepatic or lesser omentum above the pyloric end of the stomach.

These two cases I will briefly detail:

CASE 1.—A. W., aged 52, had typhoid fever, about twenty years ago. About twelve years ago he was ill for six weeks. No clear idea could be gained of the nature of this illness, as his description of it was very indefinite. There was no other sickness until about three years ago, when he began to have attacks of pain in the epigastric region, extending somewhat to the left, and attended by belching of gas and nausea. He would have to take hypodermics of morphia at times to relieve the severe pain. During the past year the attacks have been more severe. He would have nausea, but no vomiting. About six weeks ago, he began to be jaundiced for the first time. The jaundice became quite marked and has persisted with little change since. For two weeks he has been confined to his bed, and during the last four days he has had severe pain, starting in the upper epigastric region, and passing through the body and around both sides. He had no appetite, and there was no vomiting, but considerable nausea; no fever. He has lost thirty-five pounds during past year. He formerly drank quite hard, but has drunk nothing for a year.

Examination.—Jaundice rather intense; liver dullness from fifth rib to a little below the costal margin in the mammary line; no tumor or enlargement to be felt in the abdomen, and tenderness not specially marked over the right hypochondriac region; urine scanty and

deeply colored with bile; temperature 98°; pulse 68 to 70; general appearance indicated loss of considerable flesh. The examination was otherwise practically negative.

Clinical Diagnosis.—Gall-stones obstructing the common duct.

Operation.—April 17, 1906; Bevan's incision. The transverse colon and omentum were found adherent to the lower edge of the liver. After separating these, the gall-bladder was found small, thickened, contracted about a few stones, and imbedded in a mass of adhesions. The pyloric end of the stomach was drawn to the right, and was firmly and intimately adherent to the gall-bladder, under the surface of the liver, cystic duct, and duodenum. The duodenum was also adherent to the right and to the mesocolon. In fact the entire region seemed to form an inextricable mass of adhesions. Beneath it all could be distinctly felt a large stone in the common duct.

After expending much time and effort I was forced to abandon the attempt to reach the common duct by the usual route, as it was impossible to get through the mass of adhesion without doing serious damage to the involved viscera. I then tried to reach the stone from above. By drawing the stomach downward and going through the lesser omentum just above the pylorus, the stone could be palpated easily when pushed upward from the right. Further careful dissection in this direction led down to the common duct, which was incised over the stone, and a large stone measuring nearly 2 cm. in diameter was removed. The common duct, as well as the gall-bladder, from which the stones had been removed, was drained with rubber tubing surrounded by a gauze packing, and the remainder of the wound closed. Bile flowed freely, but the oozing of blood was so persistent and so profuse that the cav-

ity had to be repacked several times in our effort to control it.

The first twenty-four hours were passed quite comfortably, but during the second twenty-four hours he failed rapidly and died April 19, 1907.

CASE 2.—Mrs. E., aged 35. About seven years ago, shortly after a confinement, she was taken with a severe pain in the epigastric and right hypochondriac regions, with vomiting. The pain lasted for some time and required an anodyne to bring relief. Similar attacks recurred at irregular intervals, and the right hypochondriac region would remain tender for some time afterward. I saw her two years ago in consultation, diagnosed gall-stones, and urged an operation, which was declined.

The attacks persisted, and she was slightly jaundiced on two or three occasions.

About June 1, 1907, she had a severe attack, with pain, tenderness, vomiting, chills, fever of from 103° to 104°, and marked jaundice. These symptoms persisted, and when I saw her again, on June 12th, her condition was quite serious. It was evident that a stone had now lodged in the common duct. Operation was consented to and performed on June 13, 1907. On opening the abdomen extensive adhesions were found involving the gall-bladder, transverse colon, pyloric end of the stomach, and the duodenum. The gall-bladder was reached, and eight or nine good-sized stones were removed. A large stone could be felt in the common duct, but the adhesions were so dense that they could not be separated without involving the walls of the stomach and duodenum, so that the ducts could not be reached by the usual route.

I then drew the pyloric end of the stomach downward, opened up the lesser omentum above the pylorus, and readily came down upon the common duct, which was incised, and a stone measuring 1½x2 cm. was re-

moved. The duct was closed with fine catgut, the gall-bladder was drained with a large rubber tube, and a small cigarette-drain was placed down to the opening in the lesser omentum.

The patient made a rapid and uneventful recovery.

These two cases illustrate the type in which the superior route, as it may be termed, is applicable.

It is well understood that in the majority of cases, even when adhesions are present, the same can be separated so that the common duct may be reached, but I have no doubt that many of you, at some time or another, in attempting to work through a mass of dense adhesions, have been so unfortunate as to unavoidably so injure the wall of the duodenum as to lead immediately, or secondarily, to that very annoying and usually fatal condition of duodenal fistula.

It was to avoid a repetition of this unfortunate accident that I sought the superior route, and I can assure you that the common duct can be reached in this way much easier than may appear at first.

It is true that in this class of cases the relations of the parts are usually somewhat distorted by reason of the pyloric end of the stomach being drawn downward and to the right by the adhesions.

The common duct, therefore, comes to occupy a position relatively more to the left and higher up. The fingers of one hand introduced deeply below and to the right, and crowding upward and to the left, make the duct more accessible. The common duct is located in the gastrohepatic or lesser omentum, as are also the portal vein and the hepatic, gastroduodenal, and pyloric branch of the hepatic arteries, and these latter are the structures which must be avoided in reaching the duct. The anterior layer of the gastrohepatic omentum is incised above, and to the left of the pylorus, the pyloric branch of the hepatic and the gastro-

duodenal arteries lying to the right and the hepatic artery above.

The finger is then passed downward and to the right posteriorly to the pylorus and the first portion of the duodenum, and anteriorly to the portal vein until the duct is reached. This, as already mentioned, is facilitated by crowding the duct upward and to the left while a stone in the duct materially aids in its identification. The duct can be incised and its lumen explored in either direction with the finger or a probe.

The after-treatment, of course, is the same as when the duct is opened by the usual route.

The advantages of this route in these cases are the great saving of time over attempting to work one's way through an almost impossible mass of adhesions, and the lessened dangers of injuring the duodenum or other structure.

A COMMON-DUCT STONE LARGER THAN ANY WHICH THE AUTHOR FINDS RECORDED

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The possessor of this remarkable object was a man forty-five years of age, born in Ireland, the proprietor of coal mines. He had suffered from indigestion for twenty years, during which time colicky attacks in the right upper abdomen had been frequent. Some times the interval between them was as long as six months; some times not longer than one week. There has usually been a chill and high fever accompanying the attack, and after this has subsided he has generally become jaundiced and, later, been troubled by intense itching. Usually, he was so ill he had to go to bed and have morphine for the pain. Vomiting, which was common, had very little effect as far as relief of the suffering was concerned.

Physical.—The region of the gall-bladder is distinctly sensitive. The skin and scleræ are tinged a deep-yellow. The pulse is slow, and there are marks of the finger-nails to be seen all over the body.

Dr. Hugo Summa, who referred the patient to me, was able with bimanual palpation to palpate a hard mass in the right abdomen at about the usual site of the common duct. This mass proved to be the stone. It must be very rarely possible to palpate a common-duct stone in situ.

Operation.—Jan. 23, 1905. The gall-bladder was considerably distended contrary to the law of Curvoisier and contained thousands of tiny stones, together with much sand and stinking bile. The common duct was of such size and thickness that we at first mistook it for some other organ or new growth. When, however, it was incised this immense stone was found, and was broken during removal. The hand of the operator could be introduced into the cavity which was left. One peculiarity about this duct was that it had dilated, not symmetrically, but to the right of its axis. The immense opening was sutured up to a large rubber tube, which was left for bile-drainage. Strips of gauze were tied to the stitches, and a rubber tube was inserted through the back.

The patient's convalescence was rather protracted on account of suppuration in the abdominal wound, but he made an ultimate excellent recovery and was walking about the hospital one month after the operation. I saw him five months later, when he was in splendid health and weighed more than he ever had in his life before. About a year later I learned that he had died, but I could not obtain any further particulars.

This immense calculus weighed about two and one-half ounces when removed, and it is four inches in length by one inch and a half in breadth. The chemical examination of it, made by Dr. Rush, shows its organic constituents to be—

Cholesterine, making up a large proportion of the substance.

Bilirubin, also in large amount.

Urobilin, a trace.

Inorganic bases: sodium, potassium, calcium, magnesium, copper, and iron. (Manganese indicated in preliminary but not confirmed.)

Acids: Carbonic, sulphuric, hydrochloric, nitric, phosphoric, and silicic.

(FOR DISCUSSION SEE PAGE 73.)

THE PATHOLOGIC GALL-BLADDER

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It is unfortunate that the final results in gall-bladder surgery have never been grouped in a comprehenvive form. Immediate results, mortality from operation, and the temporary relief of symptoms have been presented so often and on so large a scale that little more seems to remain to be said. It is important to know more of the condition of patients two, five, and ten years after the operation.

It appears that there has been a vast deal said about operating to relieve the gall-bladder of its contents, and little about the pathological condition of the viscus itself. The real problem that we ought to face every time the gall-bladder is the object of surgical attack, is how to proceed in order to leave such a condition behind that the functions of the biliary passages will remain as nearly normal as possible.

If the gall-bladder itself can be retained and will continue to maintain its normal elasticity and contractility the most perfectly ideal result will be obtained. It ought to be the aim to leave this ideal condition whenever possible; but it ought equally to be insisted that when the pathological condition of its walls is such as to prohibit future usefulness the viscus is to be ruthlessly sacrificed, unless this will entail too much additional operative risk.

It has been my observation that whenever certain pathological conditions are present the normal func-

tions will never be restored, and that only a continuation of suffering is to be expected.

To enumerate these conditions requires the array of a long list of diseased conditions:

1. Adhesions between the gall-bladder and the stomach, colon, or omentum if they are likely to recur after being broken.

2. Stenosis or even a narrowing of the lumen of the cystic duct, due to old inflammation or pressure necrosis from an impacted stone.

3. Gall-bladders with thickened walls, due to long-continued cholecystitis.

4. When external fistulæ, or fistulæ between the gall-bladder and the stomach or colon, are present.

5. When the gall-bladder wall is made up of scar-tissue largely displacing the normal muscular coats.

6. When the gall-bladder is found filled with mucus, clear or tarry, and no fresh bile.

7. In gangrene of the gall-bladder.

8. In perforation of the gall-bladder.

9. In empyema of the gall-bladder. The mucous membrane being usually destroyed over large areas.

It has been my experience that in the conditions enumerated mere draining of the gall-bladder does not permanently cure. A recurrence or a persistence of the symptoms, or the existence of an intractable fistula has been an almost invariable sequence of all operations that stop short of extirpation.

My position has always been one of conservatism, and I am not in favor of removing any gall-bladder that offers a reasonable prospect of being able to resume its functions; but I have been forced, little by little, to broaden the indications for cholecystectomy, as experience in simple drainage has not been followed by the looked-for relief.

Another observation that seems worthy of note is,

that in almost every case, when I have been in doubt whether to extirpate or drain and have finally decided to drain, it has been necessary, later, to remove the viscus, which procedure has been followed by immediate relief of all symptoms.

When qualified as it is desired to qualify the statements, the practice here proposed is not too radical, and one object of this paper it to point out that those who speak and write against the performance of cholecystectomy, referring to it as "dangerous," are not consistent in their practice, but extirpate frequently. As a single example of this inconsistency, Deaver's teachings and practice may be briefly cited. In reading his paper, presented at the Boston meeting of the American Medical Association in 1906, he gives the impression that cholecystectomy is to be resorted to only in the rarest kind of cases. Yet his statistics of operations performed on the biliary passages between January 1, 1903, and April, 1907, show that he performed cholecystectomy in more than 35 per cent of the cases. (American Journal of the Medical Science, January, 1908.)

It is far from my purpose to treat lightly the extirpation of any organ, and the retention of the gall-bladder is unquestionably desirable in every case where its retention will not be a menace to future comfort. That it is inimical to future health is positive. Unless it retains a fair degree of resiliency and sufficient contractility to be able to empty itself, and thus not serve as a stagnant pore so innocent of power to normally drain it invites infection and the formation of more stones. It will do this if any of the conditions enumerated are present, if not in every case, in so large a proportion that the few exceptions need not affect the rule.

Much has been written regarding the greater danger of cholecystectomy as compared with cholecystostomy.

In any case where the conditions are such that immediate extirpation would greatly increase the danger over mere drainage, the less dangerous procedure would certainly be preferred.

There are times when one should be content with the least possible operation which will give temporary relief. No one is justified in doing an operation by the ideal method and adding unwarrantable risks, when by waiting and, if necessary, doing a secondary operation, the danger will be less. It is only in rare cases that cholecystectomy is not proper, if indicated at all, as a primary procedure. Intrinsically, I do not believe it will usually add to the risks. The reason that in most statistical papers cholecystectomy is found to have a greater mortality than cholecystostomy, is, that the cases in which cholecystectomy is practised are more complicated and would have shown a higher mortality if only drainage had been practiced. It is the early operation, the pathologically uncomplicated case, where cholecystostomy is so universally done and where the mortality is for this reason very low. Could all the operations be done before adhesions form, before ulcerations and the other conditions inimical to the future function of the gall-bladder arise, simple drainage would suffice in each instance.

Patients are frequently met who object to an operation on the gall-bladder because they have known a number of people who have been operated upon and have continued to suffer. Sometimes, no doubt, failure to relieve is due to overlooked stones, but in most cases functionally incapable gall-bladders are the cause of the continuance of the symptoms. We are judged by results, and if the results can be improved by a more careful study of the pathological condition of the gall-bladder, retention of the viscus, with good functionating power, and the extirpation of the one that is irreparably diseased, the more credit it will be to surgery.

The indiscriminate sacrifice of healthy organs has been very justly condemned, but it is as reprehensible to refuse to sacrifice an unnecessary organ when its continued presence is a menace to health and life.

The necessity of the retention of the gall-bladder for drainage loses much of its force when it is considered that in most cases the need for drainage is removed with it. In the occasional case where the common and hepatic ducts are in need of drainage, "It is possible, in fact quite easy," as Moynihan has stated, "to drain the ducts after the gall-bladder has been removed."

(FOR DISCUSSION SEE PAGE 73.)

ACQUIRED ATRESIA OF THE COMMON DUCT, DUE TO A GALL-STONE

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By acquired atresia of the common duct is meant the condition which has developed in the individual after the functions of the liver have become adapted to extra-uterine requirements, and have been normal, to all intents and purposes, beyond the period for the onset of icterus neonatorum. It excludes congenital anomalies of development in the bile-passages and the class of cases presenting, at or soon after birth, cirrhosis, cholangitis, and obliteration of the bile-passages, more particularly the common duct.

Of congenital obliteration of the bile-passages, due, presumably, to the action of a maternal toxic agent on the fetal liver and bile-passages, there are more than sixty cases recorded. Almost all are associated with cirrhosis. The cholangitis seems to be a descending process affecting eventually the extrahepatic bile-passages and leading to their obliteration. That some cases of cirrhosis go to a fatal termination before an obliterative process has been started, or completed, seems established. Likewise, that in some the obliterative progress is delayed, or extremely slow in action, seems true. In this connection Treves' case is difficult to classify, in that jaundice did not set in until the patient was two years of age. He operated upon the patient successfully by cholecystenter-

ostomy at nineteen years of age for obliteration and absence of the lower end of the bile-duct.

On the other hand, as will appear in connection with other and more clearly defined cases of acquired atresia, the obliterative process may have been due to the irritation of a gall-stone passed subsequently to the onset of jaundice and before operation.

Before the operative treatment of cholelithiasis became generally practiced and the large series of operated cases were collected, pathologists—Orth, Ziegler, and others—mentioned the condition of acquired atresia of the bile-passages, but, usually, scantily and with reference to its rarity. Surgical records bear out this view. Kehr[1] had operated on more than four hundred cases of gall-stones before encountering an instance of complete obliteration of the choledochus. In his case there was complete obliteration of the common duct at the mouth of the cystic, caused by a stone and ulcer. The duodenal part of the common duct was converted into a pus-containing cyst. No bile was found in the hepatic duct above the stricture, due to long existing stasis and its consequent disturbance of the liver-cells. Resection of the stricture of the common duct, with drainage of the hepatic, accomplished a cure. Robson[2] does not mention an instance of his own occuring in 539 operations, but refers to the case of Treves[3] mentioned above. Moynihan[4] mentions the possibility of the condition, but refers to no personal experience with it. A somewhat careful but incomplete review of the literature has yielded other cases so few in number that a brief account of each may be of interest.

Ashley's[5] case was that of a girl, seven years of age, who had been jaundiced for two years, and a half. The common duct was obliterated near the duodenum, but the proximal part, together with the cystic duct, formed an enormous cyst containing sixteen pints of

bile-stained mucus. In a period of three months she was tapped ten times, and on each occasion eight to ten pints were removed. Post mortem, the cyst was found to consist of the cystic and common ducts, between the latter of which and the duodenum no communication was found.

Oxley's[6] case showed an obliteration of the duodenal termination of the common duct, with the rest of the common duct dilated so as to form a cyst the size of a cocoanut. Rolleston[7] mentions a child of nine years in whom syphilis was suspected but not proved. Here the cystic and hepatic ducts were dilated, and the common duct to the size of a fist. The gall-bladder was atrophied and collapsed. The opening of the common duct into the duodenum could not be found. St. Bartholomew's Hospital Reports (vol. xxx, Surgical Registrar's Reports, p. 216) contain the history of a case illustrating cicatrization of an ulcer due to gall-stone, as follows:

"A woman, 46 years of age, was operated upon for recurrent attacks of biliary colic. The gall-bladder was empty and contracted, but the cystic duct was dilated by five calculi, which were removed. The cystic duct was united to the abdominal wound, and bile discharged for ten days. The patient then got worse and died suddenly. At the autopsy the common bile-duct was dilated and contained several calculi; its opening into the duodenum was completely obliterated by cicatrization of an ulcer."

Pye-Smith[8] records a case of stenosis of the common duct due to the stone-ulcer-cicatrix sequence. St. Thomas Hospital Reports (vol. xxx, p. 169) contain an example of a tight stricture of the common duct, with a soft calculus just above it, in a woman 26 years old. Simple stricture was found in a case reported by Holmes[9] and Moxon[10] at the beginning of the common hepatic duct, which, except for bile-rubin-calcium

stones, would not be subject to gall-stone irritation. In one of the cases reported by Moxon and Phillips[11] there was no history of gall-stones. Rolleston[12] describes the only case of simple stricture of the common bile-duct which has been detected at St. George's Hospital in the last fifteen years. It was as follows: "A man, aged 60 years, with chronic jaundice, was admitted with pneumonia, which proved fatal. There was a fibrous stricture of the common bile-duct in its lower fourth, and great distention of the gall-bladder and bile-ducts. There was no evidence of any malignant disease or of gall-stones." Krokiewicz[13] reported the case of a woman, 57 years of age, in whom the lower end of common bile-duct was much stenosed as if from the stone-ulcer-cicatrix sequence, but upon microscopic examination the process was found to be carcinomatous. Cordier[14] reports the case of a man, 55 years of age, with gall-stone history established by the passage of stone in stool and persistent jaundice, in whom at operation a gall-bladder containing four pints of bile and mucus, but no stone, was found. There was a complete stricture of the common duct just behind the duodenum. Anastomosis between the gall-bladder and jejunum resulted favorably. Another case of the same writer is that of a man, aged 21 years, who began at three years to have colic and jaundice. The stools at the time of operation were, however, slightly bile-stained. At operation an impermeable stricture of the lower end of the common duct was found. As in the previous case no stones were found, and an anastomosis between the enlarged gall-bladder and jejunum gave a successful issue. The presence of bile in the stools, even though in small amount, shows that the process of cicatrization was not complete, hence, strictly, the case should not be included as one of atresia. The same writer reported a case of obliterated common duct following trauma over the liver and with-

out the presence of stone in a man 55 years of age. Cholecystjejunostomy resulted favorably.

The cases cited serve to show the comparative infrequency of this condition, as well as the wide range of complications which may be encountered, except cirrhosis, which occured in the writer's case. Atresia due to carcinoma of the papilla of Vater and the head of the pancreas, is to be expected; likewise, atresia due to extradural pressure from any cause, i. e., tumors, inflammatory or neoplastic, and rarely adhesions.

By common consent the etiology of the condition is regarded to be infection, usually associated with gallstones, although the stone has not always been found. In such cases the stone is presumed to have been present, and has started the ulcerative process and been passed before the stricture became complete. Some have likened the process to that of obliterative appendicitis and urethral stricture. The pathological interpretation of the condition rests upon the formation of an ulcer due to infection alone, or to infection plus mechanical damage due to the irritation of a stone, leading to new connective-tissue formation and subsequent cicatrical contraction. In some of the cases cirrhosis was present in the liver. In this class of cases some question has arisen in regard to the sequence of events. It has been difficult to establish the priority of the bile-passage process in most instances, but in some of the so-called congenital cases this was determined in the affirmative. Further observation, too, seems to prove that congenital anomalies of the bile-passages are less often predisposing factors than formerly thought to be the case.

The diagnosis of atresia of the common duct cannot be made exactly before operation. In the presence of long-continued and persistent jaundice and bileless stools with a clear gall-stone history and without demonstrable tumor or gall-bladder, one might suspect

the condition on the basis of Courvoisier's law. Among the cases cited, however, there are several with enlarged gall-bladders associated with a history of gall-stones, if not actually with the stones. Cirrhosis, being an infrequent complication of obstruction of the common duct, in fact, of the acquired cases so called, the writer's is the only one I have encountered, although common among the congenital cases so called, would be no aid. These facts, taken together with the absolute infrequency of acquired atresia, would make the diagnosis a mere guess.

The procedures for the relief and cure of atresia have already been suggested in connection with the summary of reported cases, i. e., resection and various anastomoses of the gall-bladder or the ducts to the intestinal tract. It is conceivable in the case of an atresia low down at the papillary orifice that Kocher's operation of trans-duodenal choledochotomy might do very well, sewing the mucous membrane of the duct and duodenum together on either side of the incision. In the presence of cholemia, and especially hemorrhage, a primary incision of the common duct for drainage and recovery from the cholemic state, with secondary resection or anastomosis, would be valuable in desperate cases. In general, atresia being a late stage in the natural history of cholangitis with, or without, cholelithiasis, Richardson's rule of operating for gall-stones as soon as they begin to offend has the value of prophylaxis in this class of cases.

REPORT OF CASE

When seen July 19, 1904, J. B. C., female; married; aged 66 years; nativity, Massachusetts; residence, Dubuque, Iowa, gave this history in connection with her illness, which had existed two years and nine months.

Family history was negative. Previous history also negative except for severe headaches and occasional palpitation.

Present illness began October, 1901, two years and nine months ago, with sudden and severe pain in the abdomen in

the region of the 9th and 10th ribs, vomiting, purging, chills, and fever. The attack lasted one or two days, and subsequent prostration delayed the patient's return home from Massachusetts two weeks. Three weeks after her return home she began to experience excruciating soreness in the same region as before and extending around the ribs to the right shoulder-blade and shoulder. This condition, with variations in severity, lasted all winter. In April, 1903, the patient experienced a sensation of pushing and grinding, starting in the right side. This extended across the back and abdomen, and lasted two weeks. With this girdle pain she was confined to her bed, and jaundice set in. This has persisted. From a weight of 116 pounds she gradually lost 36 pounds, but the loss of strength was not as great in proportion as the loss in weight. With the jaundice there was loss of appetite, itching, dullness of the sensorium, many slight chills, and once a severe attack with high fever. The stools, which had been dark, became clay-colored. The urine has been scanty and high-colored most of the time since the jaundice set in, and the patient has had to micturate as often as four times at night. April, 1904, the feet began to swell slightly, and later the body. The bowels, irregular and costive before, began to be irregular and loose, moving three to four times in twenty-four hours, and accompanied by pain in the lower abdomen.

At present the patient suffers no longer with headaches, gets faint at times, has enjoyed a fair appetite until the last few days, is not troubled with belching or heart-burn, has some shortness of breath, but no cough, occasional palpitation, which, however, antedated the illness in question. Weight, two weeks ago, 86 pounds. Stools, watery and cream-colored.

Examination revealed a short, jaundiced woman, with spare body above the waist; prominent abdomen, and slightly pedematous lower extremities: pulse, 90; temperature, 99.2°; respiration, 16; sclera, bile-tinged; lungs, negative; heart, apex beat third interspace inside nipple, and no murmurs; liver dullness extends from fifth rib in mammillary line to four finger-breadths below the costal margin; ascites present and prevents examination of other abdominal viscera, but no tumor made out nor tenderness except near the costal margin on a line between the 9th rib and the umbilicus; circumference of abdomen at umbilicus, 86 cm.; urine, high-colored, acid; sp. gr., 1032; bile, present; albumin, slightest possible trace; sugar, none; occasional hyaline cast; some small round epithelial cells, probably from kidney; a few abnormal red-

blood corpuscles; abundance of various forms of large epithelial cells, probably from the bladder; and pus corpuscles. The next day six quarts of ascitic fluid were removed, having a specific gravity of 1011, and a trace of albumin. The abdomen was now soft, and permitted satisfactory palpation. The liver was felt to be hard and smooth for three finger-breadths below the costal margin on the right, and to reach more than half way to the umbilicus, thence across the epigastrium transversely where the edge could be easily grasped between the fingers and thumb of the same hand. In the epigastrium slightly to the right of the median line below the liver margin numerous, hard nodular masses, slightly tender and movable, were made out. The liver itself was not tender, but the region of the gall-bladder was still markedly so. The spleen was enlarged. The abdomen otherwise negative.

After carefully considering the hazards of operation in the presence of jaundice and, more particularly, ascites, the patient decided upon operation. Accordingly, through a vertical incision through the right rectus the abdomen was opened. The residual ascitic fluid was removed. The viscera were found congested, and, in addition, in the upper right quadrant they were densely adherent. So far the hemorrhage was not extraordinary, but upon separating the adhesions the fresh surfaces bled freely and continuously in spite of ligatures and the fact that no demonstrable vessels were severed. A hard, cirrhotic liver and several enlarged lymphatic glands were readily found, and a small, contracted gall-bladder identified. From this stage on further exploration had to be done almost entirely by palpation on account of hemorrhage. A movable stone, the size of an olive, was felt in the common duct, but no evidence of malignant growth was made out. By this time the hemorrhage had become alarming, and so obscured the field that the attempt to incise the common duct, to allow for bile drainage, at least, or in fact, to proceed further, had to be abandoned. The field was packed, and the abdominal wound partly closed. The patient left the table showing signs of shock and hemorrhage, and died fourteen hours later from complete exsanguination in spite of calcium chloride, etc.

Shortly after death a partial autopsy was performed. At this the abdominal cavity was found entirely free from clots although the pelvis contained free blood. The findings at the operation were confirmed. The gall-bladder was contracted to the size of an olive. The common and hepatic ducts were greatly enlarged. At the junction of the cystic and common ducts was found a cicatricial contraction of the cystic duct.

In the bladder and ducts were several small, flat concretions. Upon removal of the large stone from the lower end of the common duct the condition of atresia of this duct was discovered. The lower end of the duct was perfectly smooth without a sign of opening into the duodenum, and might be likened to the blind finger-end of a rubber glove. The bile tract, a portion of the liver, the duodenum, and the pancreas were removed en masse and examined macroscopically and microscopically. Macroscopically, the liver presented the appearance of hypertrophic cirrhosis, but under the microscope the changes of atrophic cirrhosis were present. Macroscopic examination showed atresia of both the common duct and that of Wirsung. The duct of Santorini could not be found, and there was entire absence of the papilla on the duodenal side. Microscopically, the ductus choledochus, that of Wirsung, the pancreas, and the duodenum showed chronic inflammatory changes, but no malignant elements. Bile was present in the common duct. The stone was found to be a mulberry calculus composed almost entirely of cholesterin with the poles made up superficially, at least, of bile pigment and calcareous salts.

BIBLIOGRAPHY

1. Kehr, H.—Introduction to the Differential Diagnosis of the Separate Forms of Gall-Stone Disease, 1901 (translation), page 48.
2. Robson, A. W. Mayo—Diseases of the Gall-Bladder and Bile-Ducts, 1904.
3. Treves, F.—The Practitioner, January, 1899, page 18.
4. Moynihan, B. G. A.—Gall-Stones and Their Surgical Treatment, 1905.
5. Ashley—Medical Chronicle, October, 1898, page 28.
6. Oxley—Lancet, 1883, Vol. II., page 988.
7. Rolleston, H. D.—Diseases of the Liver, Gall-Bladder, and Bile-Ducts, 1905, page 652.
8. Pye-Smith, P. H.—Transactions Pathological Society, Vol. XXIV., page 205.
9. Holmes—Transactions Pathological Society, Vol. IX., page 130.
10. Moxon—Idem, Vol. XXIV., page 129.
11. Phillips—Transactions Clinical Society, Vol. XXI., page 26.
12. Rolleston, H. D.—Diseases of the Liver, Gall-Bladder, and Bile-Ducts, 1905, page 654.
13. Krokiewicz—Wien. Klin. Woch., March 31, 1898, S. 321.
14. Cordier, A. H.—Surgery, Gynecology, and Obstetrics, Vol. II., pages 381-382.

(FOR DISCUSSION SEE PAGE 73.)

THE DIFFERENTIAL DIAGNOSIS OF DUODENAL ULCER AND GALL-STONES

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Prominent symptoms in common are pain, vomiting, and gas, together with the deleterious influence which these symptomatic manifestations exert on the general health of the patient. It is to a correct interpretation of these symptoms and their influence that we must turn in an attempt to distinguish the two diseases, essentially distinct entities, yet closely related symptomatically and anatomically. Both complaints are referred to the upper right quadrant of the abdomen; and while the pain in cholelithiasis, which is sharp, decisive, and of sudden onset, is referred to a point opposite the right ninth costal cartilage, it may radiate over the entire right side of the abdomen, and not infrequently it finds expression in the right shoulder-joint. Again, the pain may be most intense in the region of the tenth dorsal vertebra.

Jonas has shown that the gall-bladder and ducts receive their nerve-supply from the terminal filaments of the four lower dorsal and the two upper lumbar nerves. The nerves, after leaving the cord, pass forward over the diaphragm and between the folds of the gastrohepatic ligament, which explains, not only the pain in the back, but also the diaphragmatic spasms which so often accompany gall-stone attacks. The attack causes the sufferer much anxiety; profuse perspiration and vomiting follow shortly after the first on-

slaught of pain, and great exhaustion remains after the paroxysm has subsided. Vomiting, if present, is characteristic, in that the ejected matter is bile-stained, consisting largely of mucus and affording no relief to the patient. Hot fomentations may give temporary relief, but full doses of morphine are usually required to allay the terrible suffering. The symptoms disappear as suddenly as they come, and the patient, in the course of a few days, will show little trace of the scourge through which he has so recently passed.

In duodenal ulcer the pain recurs at intervals, and is less sudden of onset and severe in character. It is described as a burning or gnawing sensation, which may last a few days or continue for months after the primary attack. Unlike the lancinating pains of gall-stones, pain in this disease is markedly influenced by the presence or absence of food in the stomach. A certain degree of relief invariably follows the ingestion of a full meal, lavage of the stomach, or the drinking of a quantity of alkaline fluid. The explanation for this is found in the dilution or neutralization of the stomach secretions, which are always hyper-acid in the early history of duodenal ulcer. The pain or distress in ulcer cases is greatest four or five hours after a meal has been taken, and it is due to the passage of the stomach-contents over the sensitive, ulcerated mucosa lining of the duodenum.

Spasm of the pylorus is a frequent accompaniment of ulcer, but it is wholly unknown in early gall-stone cases.

Spasm of the diaphragm is evidence of severe pain, which, if referred to the region under consideration, indicates gall-stones, as ulcer pain in the absence of perforation, is not of sufficient severity to produce this symptom.

Gaseous distention speaks for ulcer, and the accompanying pain quickly subsides after expulsion by

eructations or vomiting. In the absence of pyloric spasm or obstruction, with a fair degree of stomach motility, ulcer cases feel best immediately after taking food.

Muscular rigidity and local tenderness are present in both ulcer and stone cases. Mr. Moynihan told the writer that he had frequently observed a small hyper-sensitive spot in the skin covering the abdomen directly over the ulcerated area. It is no larger than a sixpence, and he attaches much value to this phenomenon in differentiating ulcer.

It has been definitely determined by clinical evidence and operative procedure that pain in duodenal ulcer is due—

(a) to passage of acri-acid stomach-contents;

(b) to distention by gas.

As an illative consequence, pain or distress will be greatest in those cases of excessive acid or great distention; on the other hand very little discomfort may be present in ulcer cases where little, or, as Einhorn has said, no acid is found. It is in this variety of ulcer, which is called latent, whose first symptoms may be those of perforation, that the diagnosis is impossible until the calamity of rupture occurs.

Vomiting is of less value as a symptom than either pain or distention, but it is well to remember that vomiting is full and free, followed by marked relief and ceases promptly in ulcer cases, leaving little depression and no nausea. No relief is obtained, nor does vomiting cease with emtying the stomach-contents, in stone cases, but a continuous nausea and occasional vomiting of bile-stained fluid continue throughout the attack in recurrent cases, while, if the diagnosis is established early and treatment instituted at once, vomiting may never appear as a symptom in gall-stones. In late or recurrent gall-stone histories, vomit-

ing is a prominent feature, and the same may be said of chronic ulcer, but the slight, transitory disturbance of the one and the invalid-dealing influence of the other, will materially assist in putting one right in the diagnosis.

The far-reaching, baneful influence of the lack of nutrition and the calamity of perforation are the features most prominent in many ulcer cases when they reach the hands of the surgeon. The patient eliminates one article of diet after another until he is reduced to starvation rations before relief of more or less permanency is obtained.

Hemorrhage occurring during an attack of gall-stones is accidental, but it is prominent as one of the late manifestations in ulcer.

One of the first indications to attract the attention of the observer may be the presence of blood in the stool, but one should not forget that it is a late and dangerous symptom, and that small hemorrhage from duodenal ulcer may be followed by great depression, collapse, and a fatal termination.

Jaundice, like hemorrhage, is a late symptom, and may be present in either of the conditions under consideration. This symptom is more constant in stone than in ulcer, and while the obstruction is most frequently due to the lodgment of a calculus in the former and an inflammation of the choledochus in the latter, adhesions may produce jaundice in both diseases in the absence of either of the above factors.

Jaundice following lancinating pain of sudden onset localized in the upper right quadrant of the abdomen, radiating over the right chest-wall, or accompanied by pain in the right shoulder, would warrant a conclusion of the presence of gall-stones. Do not, however, be surprised if ulcer is found to co-exist with stone, as the initial pathological condition is, ac-

cording to many competent observers, one and the same, i. e., altered stomach secretions.

Constipation is one of the early effects of duodenal ulcer. It may be present very early in the history of the disease, and is due to altered secretions, absence of flora, pylorospasm, and motor insufficiency. Constipation may be very obstinate and constitute the dominant note in the history.

Although the well-known, significant clay-colored stools are pretty constantly present in gall-stones, constipation is the exception rather than the rule in these cases.

By a careful reading of the early histories of these afflictions one may be fairly accurate in his decision, but in the old cases where repeated attacks have resulted in inflammatory adhesions, impacted stone, pancreatitis, and impaired motor and secretory stomach-function, with their blighting influence upon the general economy, one is confronted by an almost endless pathological chain whose correct interpretation is exceedingly difficult.

Finally, in a certain percentage of the chronic and some of the acute cases of stone and ulcer, differentiation will be reserved for that erstwhile, much-used, sometimes abused, method of diagnosis, exploratory incision.

(FOR DISCUSSION SEE PAGE 73.)

PEPTIC ULCER OF THE JEJUNUM

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OSHKOSH, WISCONSIN

Peptic ulcer was originally supposed to be confined to the stomach, but increased experience and more careful observation have resulted in the discovery that such ulcers occur very frequently in the duodenum. Peptic ulcers of the esophagus have been reported, and, as a result of the operation of gastrojejunostomy, are now occasionally found in the jejunum.

Peptic ulcer of the jejunum is an unusual condition. The first case was reported by Braun[1] in 1899, eighteen years after the first gastro-enterostomy was performed by Woelfler.

In 1903 Watts[2] collected 14 cases, and in the same year Brodnitz[3] gathered 15 cases of this character. Mayo Robson[4], in 1904, analyzed 16 cases, and Tiegel[5], in the following year, was able to find 22 cases.

In the literature up to January, 1906, Gosset[6] mentions 31 cases, in a most complete review of the subject. Since then we have one case in our experience and have noted seven additional cases in available literature, making a total of 39 cases.

The great majority were those in which acute perforations have occurred. The supposition that many cases are not reported, or that the nature of the perforation is unrecognized, is quite reasonable, as is likewise the probability that those in which acute perforation has taken place, are attributed to other causes. These

probabilities, with the rapid increase in the number of reported cases, tend to the belief that this condition is more common than those in the literature would seem to indicate.*

That it is a rare complication is without doubt; as is also the fact that it is a real danger. An estimate as to the percentage of gastro-enterostomies in which it may be expected to occur, is at present impossible because of the small number. Kausch[3], from Mikulicz's clinic, reported 2 cases in 160 gastro-enterostomies. Watts[2] considers this too small a proportion. Paterson[8] found perforating jejunal ulcer in 3 of 295 such operations. He places the risk at less than 2 per cent. Robson's[4] case occurred in 30 anterior gastro-enterostomies, but such a complication did not occur in 16 posterior operations of this character, nor in 100 similar ones by a colleague. Moynihan[9] mentions one possible case in 218 gastro-intestinal anastomoses.

J. C. Munro[10] says we have no definite data as to the occurrence of peptic ulcer. Such a lesion may explain the late unheralded hemorrhage in two of our cases of duodenal ulcer occurring in 150 gastro-enterostomies. Rarely coming in the posterior operations, as statistics show, we believe the fear of this accident is a small contra-indication in cases otherwise suitable for operation.

Jejunal ulcer is conspicuously absent in the remote results of gastro-enterostomy in the hands of American surgeons. In January, 1907, Hamann[11] reported the first perforative case in America. Two cases have occurred in experimental work, in a dog (Watts)[2] and a cat (Gould)[12].

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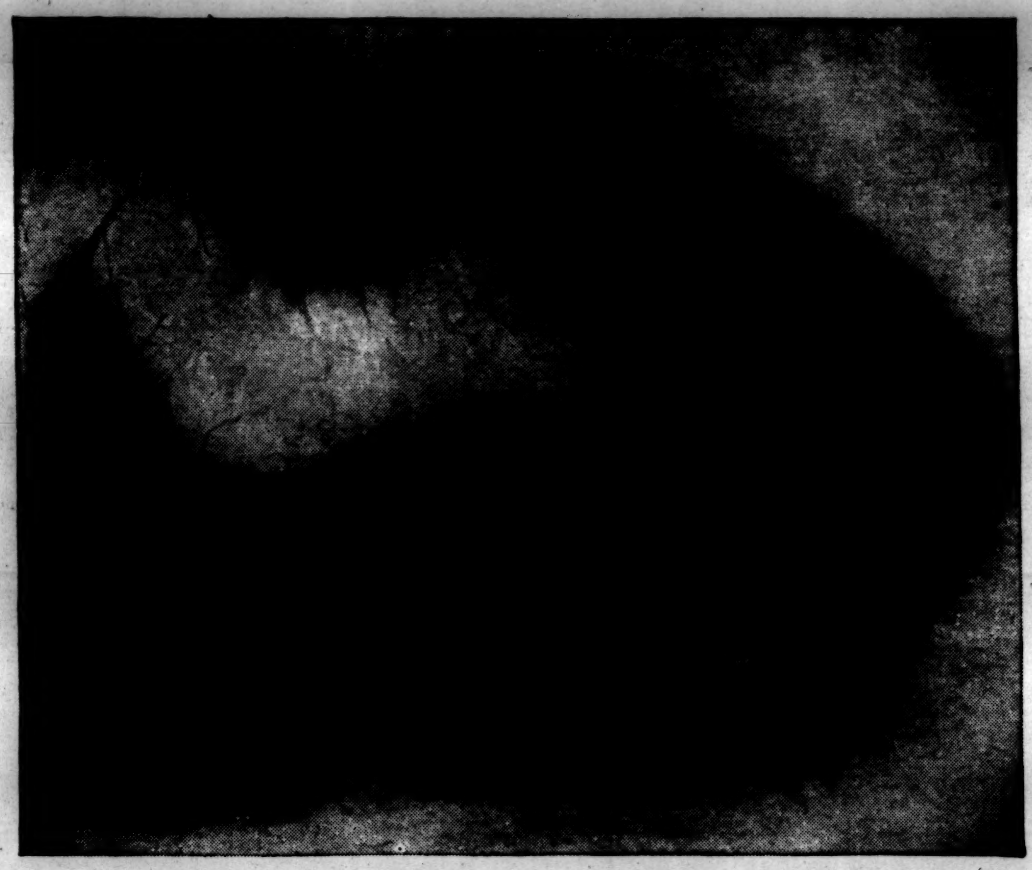
*Since the completion of this article. I find a recent contribution in the Scandinavian literature by Einar Key[21] on "The Surgical Treatment of Ulcer of the Stomach," in which five cases of peptic ulcer of the jejunum are reported from the clinic of Berg, and one from that of Lenander. The latter is notable, as it is the first instance in which this condition is reported as following gastro-enterostomy for carcinoma of the stomach. In addition to these 6 cases, 49 are collected from the literature.



Anterior gastrojejunostomy, showing the healed perforated jejunal ulcer at one extremity of the obliterated stoma.

The occurrence of peptic jejunal ulcer, without a previous gastro-enterostomy is unknown, and only one case has been reported in which it followed a similar operation for malignant disease (Lenander, mentioned by Key[21]), nor has it been known to follow operations of pyloroplatsy or gastroduodenostomy.

Pathology.—In both macroscopic and microscopic appearance the ulcer is similar to peptic ulcer occurring in the stomach or duodenum. It is usually single; in 3 of 24 cases it was multiple, in one instance four ulcers being present. It may be associated with similar ulcers of the stomach or duodenum. The usual location is at the stoma or in the jejunum within from 1 to 7 cm., generally in the distal limb of the loop. In one case the ulcer was found near the stoma of an entero-enterostomy which had been perforated in addition to the gastro-intestinal communication.

Etiology.—Mikulicz had one case occur after operation for congenital stenosis of the pylorus in a child three months of age. The other extreme in age was 59 years, the average being above 30. Male patients were much more frequently involved than the opposite sex. In 37 cases there were 35 males and 2 females. Ulcers of this variety occur after gastro-enterostomy with or without stenosis of the pylorus.

It has been generally believed that the causative factor is the hyperacidity of the gastric juice, or the normal gastric juice coming directly into contact with the mucosa of the jejunum without previous neutralization by mixture with the bile, pancreatic juice, and the succus entericus in the duodenum. Most of these ulcers occur in the distal limb of the jejunal loop. In cases in which gastric analysis was carried out, the majority were found to have an excess of acid, though it was not constant. A noteworthy fact in this connection is that ulcer of the duodenum does not

occur after pyloroplasty or gastroduodenostomy, nor does peptic ulcer of the jejunum occur after gastro-jejunostomy in cases of carcinoma, in which there is generally a hyperacidity, the case of Lenander being an exception.

Paterson[12] says:

"The predisposing or the exciting cause of peptic jejunal ulcer is probably persistence, or subsequent development, of hyperacidity after operation, and consequent digestion of the jejunal mucous membrane by the hyperacid juice. What then are the causes of hyperacidity after gastrojejunostomy? We suggest that in most instances hyperchlorhydria is due to insufficient size or inefficient working of the anastomotic opening. I quite admit that a slight degree of gastric stasis, due to a small anastomotic opening, may have no ill result, but is it not reasonable to argue that in such a case a slight attack of gastritis due to some error in diet, insufficient to cause trouble if the anastomotic opening were larger, may lead to such a degree of gastric stasis that hyperchlorhydria ensues, and this produces, or at least disposes to, peptic jejunal ulcer."

Doubtless in some cases oral sepsis or long-continued indiscretions or excesses in diet may lead to septic gastritis and stasis, however large the anastomosis opening may be.

In one case direct traumatism to the abdominal wall was supposed to be the cause. Direct injury by food particles, or indirect injury to the mucous membrane at the time of operation, may account for some of these cases. With the aretriosclerosis of the vessels of the mesentery, a very slight kinking of that structure may interfere with the blood-supply and so predispose to the formation of ulcer.

The frequent occurrence with the anterior operation has been explained by an interference with the

circulation of the loop as it was brought over the colon and the omentum. In Mikulicz's consideration of the subject, he stated that it always followed anterior gastro-enterostomy, but in 34 cases in which the location of the anastomosis is mentioned it is found that the anterior method was employed 25 times, in 6 of which an additional entero-anastomosis was made, and in one a previous pyloroplasty had been done, and that the posterior operation was performed 9 times, only 2 of which were supplemented by entero-enterostomy.

In the two cases occurring in animals the operation was anterior, and in this connection it must be remembered that Cannon and Blake[14] have shown that the anterior operation in animals is the nearest possible approach to the conditions of the posterior operation in man.

The great majority of the above cases are from the German clinics where the anterior operation has most frequently been employed. As to whether the loop of the jejunum was twisted or not we do not find sufficient data to warrant an opinion as to this being a possible etiological factor; but in the posterior operations there has probably been a twisted and longer loop than is customary with the more recent and perfected technic, which brought the opening in the jejunum farther from the duodenum. In the posterior operation the jejunal opening is about nine inches from its origin; in the anterior operation the opening is from sixteen to twenty inches from that point.

It would seem that with the no-loop and no-twist posterior gastrojejunostomy the danger of peptic jejunal ulcer is reduced to a minimum.

Of the 17 cases in which the method of anastomosis was mentioned, the suture was used 10 times, the Murphy button 6 times, and the Robson bobbin one.

Symptomatology.—The symptoms are those of gas-

tric or duodenal ulcer. Jejunal ulcer should be considered as a possibility in every case in which there is a return of the symptoms for which the gastro-enterostomy had been performed. The symptoms may be latent and may be ushered in by an acute hemorrhage or perforation. Acute perforation and general peritonitis took place in 14 of 39 cases.

The more usual history is that of chronic perforation, as is shown by a return of the original stomach symptoms, with pain, nausea, vomiting, hyperacidity, and melena, with local tenderness and rigidity. Such a condition was found in 25 of the cases, in 3 of which there was an internal fistula communicating with the large bowel.

The length of time between the operation and the onset of the symptoms may vary within marked limits. The presence of a symptomless period, of longer or shorter duration, after the gastro-enterostomy is necessary for the purpose of excluding an uninterrupted continuation of the symptoms for which the operation was performed.

In 36 cases in which this interval was mentioned there were—

Eight cases in which it was 6 months or under.
Four cases in which it was between half and 1 year.
Ten cases in which it was between 1 and 2 years.
Four cases in which it was between 2 and 3 years.
Six cases in which it was between 3 and 4 years.
One case in which it was 5 years.
One case in which it was 7 years.
One case in which it was 8 years.
One case in which it was 9 years.

The shortest interval was ten days and the longest nine years.

A differential diagnosis can rarely be made between such conditions as peptic ulcer of the jejunum and a

return of gastric or duodenal ulcer, complete or partial closure of the stoma, adhesions, kinks or other forms of incomplete obstruction, or the so-called vicious circle.

Treatment.—The treatment will primarily be prophylactic, which will consist of internal medication, in post-operative cases, such as routine medical treatment of gastric ulcer with sodium bicarbonate to reduce or counteract an excess of acidity, which should be continued for at least a number of months, by which time it may rationally be supposed that the jejunal mucosa has become accustomed and resistant to the abnormal and irritating chyme that enters through the stoma. After the onset the treatment will be either medical or surgical, according to the variety of the symptoms.

With the chronic cases some will be improved or cured by the regular routine medical treatment for gastric ulcer (2 such cases in 40), others will persist in spite of such treatment, and will therefore demand operative interference.

With acute perforation there is, of course, nothing to be considered but prompt surgical intervention with repair of perforation and treatment of peritonitis. Various possible operative procedures may be carried out, such as inversion and suture of the ulcer; excision of the ulcer, resection of the jejunum, with or without entero-enterostomy or jejunostomy; gastro-enteroplastic operations; secondary gastro-enterostomy; separation of adhesions, or drainage of the abscess. If the pylorus is patent, with no demonstrable ulcer of the stomach or duodenum, the stoma may be closed.

The peritonitis will be treated according to generally accepted lines, i. e. removal of the cause by closure of the perforation; no irrigation, with drainage; Fowler's position, and proctoclysis.

Since the publication of the monograph by Gosset[6], which reviews the subject up to January, 1906, we re-

port one personal case and collect seven from available literature.

1. In our own case anterior gastrojejunostomy was performed by Dr. C. W. Oviatt, in 1903, for gastric ulcer with pyloric stenosis and dilatation of the stomach. This was followed by relief for two years, after which there was a gradual return and increase of stomach symptoms. Three years after the operation these symptoms demanded a second operation, at which there was found a cicatricial stenosis of the pylorus with dilatation of the stomach and practical obliteration of the gastro-intestinal stoma. A piece of linen about a half inch long was buried in the mucous surface at the linear cicatrix which marked the site of the gastro-intestinal anastomosis. At one end of this cicatricial depression, the end toward the cardia, there was a marked induration or thickening of the jejunal wall. This mass was about one-half inch in length, and one-quarter inch wide, and was elevated one-eighth of an inch above the surrounding mucosa. It was fibrous in consistency, with its surface white and smooth. It extended through the jejunal wall to the greater curvature of the stomach, to which it was adherent.

A second anterior gastro-enterostomy was done with prompt and (thus far, nine months) permanent recovery.

2. Dudgeon and Sargent[15] report a case of perforation of a peptic ulcer of the jejunum occurring in a male 30 years of age, twenty-two months after gastro-enterostomy for simple gastric ulcer. Acute symptoms had been present for four hours before the operation. The perforation was close to the stoma, around which the peritoneum was reddened and covered with flakes of lymph. Invagination of the ulcer, with flushing and drainage, was followed by recovery.

3. Hamann[11] did anterior gastrojejunostomy with entero-enterostomy in a male 48 years of age for gastric ulcer. The Murphy button was used in each anastomosis. The smaller button passed on the 11th day, with smooth convalescence until the twenty-first day, when he complained of epigastric pain with the development of a tender indistinct mass in the epigastric and left hypochondriac regions. Death occurred suddenly twenty-six days after the operation. The autopsy showed perfect gastro-intestinal union, with a perforated ulcer about one inch in diameter with a sharply marked border on the anterior wall of the jejunum just beyond its junction with the stomach. The button was in situ, but this was not considered to be the cause of the ulcer. The ulcer was located

exactly where the gastric contents would come in contact with the jejunal mucosa. There was a general peritonitis.

4. Lyle[16] reports a case as follows: Male, 26 years of age, was operated upon for acute perforation of a gastric ulcer near the pylorus. There was no stenosis or dilatation. There was marked increase in gastric acidity. The perforation was closed, followed by posterior gastro-enterostomy, with entero-enterostomy. Six months after the operation the symptoms returned, but were relieved by medical treatment.

5. Rushton Parker[17] reports the case of a male 51 years of age who died suddenly because of perforation of a jejunal ulcer three years after anterior gastro-enterostomy for a non-malignant pyloric stenosis. (A pyloroplasty had been previously performed.)

6. Basil Hall[17] reports a case of sudden death, occurring while the man was drunk, from a perforated ulcer of the jejunum, located six inches below the stoma, two years after anterior gastro-enterostomy for dilated stomach.

7. Graser[18] has seen peptic ulcer of the jejunum with perforation and fatal hemorrhage four years after posterior gastro-enterostomy with the Murphy button. The stoma was reduced to the size of a lead-pencil.

8. Edington[19] reports the following case: Male, aged 46 years. Seven years ago he had acute gastrojejunostomy performed for benign pyloric stenosis. Two years ago he had cholecystostomy performed for gall-stones. The present operation was done twenty-seven hours after perforation of a jejunal ulcer. The ulcer was closed and omentum attached to the line of suture. Death took place in three and a half hours.

Of these 39 cases, 29 are from German, 5 from British, 3 from American, and 2 from French literature. In addition to the above undoubted cases since the publication of Gosset's statistics, the following probable cases have been mentioned:

Hadra[20].—This case has been included in the statistics of some writers and omitted from others. Six months after gastro-enterostomy for pyloric stenosis with hyperacidity, perforation took place. This resulted in the formation of an abscess, was drained and was followed by a fistula. Hadra was unable to determine

whether the perforation was in the stomach or the jejunum.

Moynihan[9] speaks of one case in which adhesions around the jejunum of the proximal side of an anastomosis were taken to indicate the possible existence of a peptic ulcer.

Munro[10] states that peptic ulcers of the jejunum may have been the cause of the unsatisfactory results in two cases.

CONCLUSIONS

1. Peptic ulcer of the jejunum is a possible result of gastrojejunostomy.

2. It is probably of more frequent occurrence than the reported cases indicate.

3. It follows the long-loop operation more often than the no-loop operation.

4. The symptoms may be latent until either acute hemorrhage or perforation occurs.

5. The symptoms may be chronic and simulate those of gastric or duodenal ulcer.

6. Peptic ulcer of the jejunum should be considered in all cases of the return of symptoms after gastrojejunostomy.

7. A symptomless period after the operation is necessary to eliminate a continuation of the condition for which the gastrojejunostomy was performed.

8. A differential diagnosis can rarely be made before operation.

9. Prophylactic treatment, aiming to reduce the excess of acidity, should be instituted after all gastrojejunostomies for benign conditions, and should be continued for at least six months.

10. Treatment will be either medical or surgical similar to that for gastric or duodenal ulcer.

11. The possible occurrence of ulcer of the jejunum

is an additional reason for performing gastrojejunostomy only where it is positively indicated, i. e., by pyloric obstruction.

BIBLIOGRAPHY

1. Braun—Verhandl. d. Deut. Gesellsch. f. Chir., 1899.
2. Watts—Johns Hopkins Hospital Bulletin, July, 1903.
3. Brodnitz—Annals of Surgery, December 1903, page 913.
4. Mayo, Robson—Annals of Surgery, August, 1904, page 186.
5. Tiegel—Mittheil. a. d. Grenzgeb. der. Med. u. Chir., 1905, page 397.
6. Gosset—Rev. de. Chir., January and February, 1906.
7. Kausch—Verhandl. d. Deut. Gesellsch. f. Chir., 1902.
8. Paterson—Gastric Surgery, 1906, page 22.
9. Moynihan—Surgery, Gynecology and Obstetrics, June, 1907.
10. Munroe—Annals of Surgery, June, 1907.
11. Hamann—Cleveland Medical Journal, May, 1907.
12. Gould—Operations Upon the Intestines and Stomach, 1906, page 46.
13. Paterson—Gastric Surgery, 1906, page 20.
14. Cannon and Blake—Annals of Surgery, May, 1905.
15. Dudgeon and Sargent—The Bacteriology of Peritonitis, 1905, page 68.
16. Lyle—New York Medical Journal, December 22, 1906.
17. Paterson—Gastric Surgery, 1906, page 141.
18. Graser—Progressive Medicine, June, 1907, page 83.
19. Edington—Glasgow Medical Journal, June, 1907.
20. Hadra—Verhandl. f. Deut. Gesellsch. f. Chir., 1900.
21. Key—Nord. Med. Arkiv., Afd. I. Kirurzie, No. 3, No. 5, 1907. Journal American Medical Association, December 17, 1907, page 1963.

DISCUSSION OF THE PAPERS OF DRS. BARTLETT, DAVIS, HANCOCK, HAINES, AND CONNELL

DR. CHARLES H. MAYO (Rochester): Dr. Bartlett has reported a case from which he removed the largest stone I have any knowledge of. Certainly, stones do not get as ripe as that up in the Northwest.

We have done some 2,200 operations on the gall-bladder and ducts, and of this number there were over 600 cholecystectomies, many of them for cholecystitis, and about 300 operations on the common duct. I believe that Dr. Davis is right in calling our attention to disease of the mucosa.

The question of drainage was taken up, and where formerly, a few years ago, we had a leaning towards the removal of the gall-bladder, if there was any disease of the mucosa that was microscopic, now possibly we have a leaning towards leaving the gall-bladder, if the cystic duct is open, trusting to drainage. The removal of the gall-bladder by a second operation is not as serious as a secondary operation on the common duct, which may be necessitated later, after the removal of the gall-bladder. In animals that have gall-bladders the common ducts are smaller in proportion than in those that have no gall-bladders.

We know that the bile taken from the hepatic duct and injected into the pancreas produces an acute inflammation, while that taken from the gall-bladder, which contains mucus, is much less irritating to the pancreas. I believe that the removal of the gall-bladder results later, in the majority of cases, in distension of the common duct. We have had five cases of reformation of stones in the common duct, and three of them after the removal of the gall-bladder. We have had in all the series only two cases, one of our own, where, after a primary operation of removing gall-stones from the gall-bladder, other stones formed in the gall-bladder.

As to the diagnosis between gall-bladder stones and duodenal ulcer, I found in looking up the subject that we made a diagnosis of duodenal ulcer in 67 per cent of the cases in which it occurred. We have the same set of nerves involved, and the cases that were mistaken for duodenal ulcer were instances of appendicitis, ulcer of the stomach, or gall-bladder trouble. Ten per cent of the cases diagnosed and called duodenal ulcer were gall-bladder diseases. In two instances a perforating duodenal ulcer was sealed in by the gall-bladder dropping into the perforating ulcer as large as a silver dollar, so that the gall-bladder had really filled out the area that was removed by the disease. In gall-stone disease the diagnosis is made in about 87 per cent of the cases, the other cases, duodenal ulcer and appendicitis, being about equally divided. I do not believe that it is going to be possible to make a much better proportion of correct diagnoses than I have given. Let us take, for instance, diseases of the skin where we have a chance to view the lesions. If we make diagnoses in 90 per cent of the cases we are doing well. The medical man can always be cocksure of his diagnosis, but the surgeon has got to deliver the goods. If the case is a surgical one, there must be something the matter with the individual to require an operation, and the patient does not care very much whether your diagnosis is absolutely correct or not. If there is something in his abdomen that is causing stomach trouble, from which he complains, and it is suspected, he wants to be relieved. Practically, in only one case out of ten in which a diagnosis of stomach trouble is made by the patient is an operation on the stomach called for. The patients usually have other troubles that need surgical attention.

Dr. C. H. Wallace (St. Joseph): Some two years ago I operated on a woman who had a number of stones in her gall-bladder, and the bladder was in fairly good condition. The mucosa was apparently healthy, and the viscus was not very

much enlarged, and the walls were not much thickened. The stones were removed, and drainage was instituted. In the last two months she has had gall-stone colic, and in the second attack passed a number of small stones.

The question arises whether these were some stones left or whether there has been a re-formation and the drainage instituted did not restore the bladder to a normal state. In the earlier days of gall-bladder surgery we were inclined to think that cases of this character were completely restored by removal of the stone and drainage. The return of cases in the last few years for a secondary operation and the finding of stones have proven this belief to be not well taken. I do not see why the same factors that entered into the production of cholecystitis and stone-formation in the first place might not produce them again.

Dr. John E. Summers (Omaha): Dr. Hancock, I believe, has not looked over the literature as carefully as he might have done in referring to obstruction of the lower end of the common bile-duct and of the cystic duct, because I know of several cases he has not reported or mentioned that are already in the literature. A case of my own was published seven or eight years ago. In this case there was a stricture with apparent absolute occlusion of the lower end of the common duct, and also of the cystic duct, the common duct acting as a reservoir. The liver was much hypertrophied, and so was the spleen. The spleen was very large. The technic employed was to open the common duct and to make an anastomosis between it and the duodenum. The patient made a nice recovery after a long time. The patient's general condition was bad. It was a long time before the spleen assumed its normal size, and the general condition improved gradually.

I speak of this to show that we are apt to overlook these cases. Mayo Robson has reported two or three of these cases, and I know that Dr. William J. Mayo has had one or two, because I have talked with him about them. There may be others.

Dr. James E. Moore (Minneapolis): Within the past six months I have seen two cases of gall-stones of very great interest. One was Dr. Mayo's case, and the other was my own. He operated on one, and I on the other. The history given in both cases was similar: First, ordinary gall-stone symptoms, and operation, emptying and draining the gall-bladder. Later, both patients had recurrence of the symptoms, and at the operation gall-stones were found in the gall-bladder. The

gall-bladder was found diseased, and cholecystectomy was performed.

The reason that these cases are both interesting is because now these women are suffering from gall-stone colic. The question is, what shall we do about it? Our only hope is that there may be a stone or stones in the common duct that may be reached. I have not yet operated upon a case of that kind. I believe Dr. Mayo says they have. It is quite possible that these stones may be in the hepatic duct, because in this case of my own on which I re-operated and removed the gall-bladder, the stones were many and soft. They were small and looked like millet seeds, and were evidently coming down from the liver at the time. I had the feeling that the woman would surely have trouble some time in the future. It is only two years since I did the cholecystectomy, and she is having serious symptoms and very grave attacks, but without jaundice.

Dr. John C. Morfit (St. Louis): The reading of these papers and the discussion on them have prompted me to report two cases which I think are of sufficient rarity to even justify a special report. They are instances of bowel obstruction due to gall-stones. I did not hear all of the papers, and consequently do not know whether that remote complication has been mentioned or not; but within the last year I have had two cases come under my observation within sixty days of each other.

A woman, 80 years of age, had an acute obstruction which became chronic, and finally a total obstruction of the bowel by the time I saw the case. The bowel was found obstructed at about eighteen inches above the ileocecal valve by a stone about an inch and a quarter in diameter and two inches or an inch and a half long—a cylindrical, rough stone, which had evidently come from the gall-bladder. This woman made a very satisfactory immediate operative recovery in that the bowel functions were normal; but pneumonia developed on the eleventh day after the operation, and she died on the fourteenth.

I was not fortunate enough to be able to secure a post-mortem examination in this case, but the question arises as to the pathological anatomy in the region of the gall-bladder. How did that stone get into the intestine? Did it come from the common duct, or was there a pathological anastomosis, or, rather, an inflammatory anastomosis, made between the gall-bladder and some portion of the alimentary canal? I believe that, in all probability, there was, as a result of pre-existing inflammation and ulceration, an anastomosis established be-

tween the gall-bladder and the duodenum, or possibly some other portion of the small intestine.

Within a few weeks after that case another woman, 56 years of age, presented herself and had exactly a similar condition, and I was able to strike a stone immediately in practically the same situation, the stone being the same in size and of the same consistency. The intestine was opened by means of a linear incision, the stone freed, and the incision closed, and she made an uneventful recovery.

The same question arises in both of these cases, What is the pathological anatomy of the region in the neighborhood of the gall-bladder? Such cases are mentioned in the literature as being very rare. In one London hospital two such cases have occurred in ten years, and the explanation is given that, in all probability, the stone reached the intestinal canal through a fistulous opening after an inflammatory anastomosis. Why it should cause intestinal obstruction is hard to say. In all probability, the roughness of the stone causes a spasmodic stricture of the intestines, and it is not due so much to the size of the stone as to its character, which causes the muscular spasm.

Dr. Davis (closing the discussion on his part): I do not believe, gentlemen, that I have any more desire to remove the gall-bladder than the rest of you. I find in looking over the literature that a number of operators who have reported large series of cases, point out very clearly that the number of cases of cholecystectomy varies from about 25 to 45 or 50 per cent among the different operators. I reported one in which the percentage was 35.

Dr. Mayo misunderstood one point in my paper with reference to the mucosa. I do not believe that when we find considerable disease of the mucosa, where there is destruction of a large part of it, it necessarily calls for cholecystectomy. The point I tried to make was that where we no longer have any muscular tissue in the wall of the gall-bladder we can never have enough elasticity for it to functionate normally as a gall-bladder. The only point I think we have to determine is whether the retention of a certain gall-bladder upon which we are apt to be operating at the time, is almost certain to produce future symptoms, necessitating a secondary operation, and if we find in a certain set of pathological conditions the sequel of the operation is almost invariably a continuation of the symptoms—perhaps not quite so bad or may be worse—then I believe in every case of that kind the gall-bladder should be removed. I think if we dally with the condition

we have, we are almost certain to have a continuation of the symptoms if the gall-bladder is not removed.

I do not think that the remote and almost infinitesimal chance of sometimes having a stone or stones formed in the common duct should deter us from doing this operation. It is an awkward predicament to be in to have a stone in the common duct and no gall-bladder; but that will not happen in one out of five hundred operations. When these patients present symptoms clearly indicative of gall-bladder disease, if we do not remove the pathological gall-bladder, we know that in almost every case it will give trouble.

DR. HAINES (closing the discussion on his part): It is of some interest to know how quickly stones reform, because they do reform without question, and if a stone, or stones, should form in the common duct after the removal of the gall-bladder, as indicated by Dr. Davis, the surgeon is put in a very awkward position. I had a case about two years ago in which a stone reformed in the course of ten days, and which came away with the dressing. The common duct was absolutely free from stone at the time of the operation, but several small stones were removed from the gall-bladder at the time. The man was a very heavy drinker, so that it was difficult to control him. He had a second attack of gall-stone colic, and we removed half a dozen or more soft concretions which could be mashed between the fingers. I not only introduced a scoop and cleaned out the gall-bladder thoroughly, but with the finger made sure there was nothing left behind in the gall-bladder itself. Ten days later, when the dressing was taken away, a concretion about the size of the end of the little finger and of the consistency of putty was removed.

There is one feature with reference to the case mentioned as having died of hemorrhage to which I would like to call attention. I will speak briefly of the case in order to show how I believe hemorrhage may be obviated, and that is by the use of chloride of calcium, given for a few days or a week preceding the operation.

The case I speak of was a woman who had been ill for six years. She had had many attacks and had become very greatly reduced in weight. Formerly she weighed 189 pounds, that is, when first taken ill. She was 67 years of age, and when I saw her I did not know exactly how much she did weigh, but I should say less than one hundred pounds. She was profoundly jaundiced, and had a number of hemorrhagic spots on the skin and mucous membranes over the body. She vomited everything she took into the stomach, and her

bowels were constipated. The liver was large and hard, extending within two inches of the median line. A diagnosis of carcinoma of the liver was made by several practitioners who had seen her prior to the time I saw her, and the case looked to be a hopeless one. I suggested that she be put on calcium chloride, and that an exploratory incision be made. At the end of ten days, after giving the calcium in doses of two grams, two or three times a day, we opened the abdomen and found one large gall-stone in the gall-bladder itself. In consequence of many and well-formed adhesions, we could not satisfactorily palpate the common duct, but we did pass a probe through into the duodenum, we thought. The liver was very much enlarged, as we had determined before, because the abdominal wall was thin, and we could readily palpate the organ. The margin was sharp and hard, there being a number of indentations where the capsule was drawn over it. It was dark in color and hard. The gross appearance was that of malignancy. We drained the gall-bladder; the stomach and all other symptoms immediately subsided; the patient took on weight, but the fistula did not close. The primary operation was done in May of this year. Late in September I opened the abdomen again, feeling I had overlooked a stone in the common duct, which was true. I found there a stone, three-quarters of an inch in diameter and very hard. The liver was about normal in consistency and size. Swelling and induration disappeared, and the woman began to increase in weight until to-day she weighs 170 pounds. I mention this one feature, believing that a little preparatory treatment in these cases is of great importance. These patients who are profoundly septic from lack of drainage will bleed very readily, and some of them may succumb to the hemorrhage alone, and I think the blunder in this case of overlooking the stone at the first operation probably saved this woman's life.

Dr. Hancock (closing the discussion): In regard to Dr. Summer's remarks: I want to thank him for calling my attention to the other cases he mentioned. I will state, however, that I did not complete my review of the subject, for the reason that the library which I consulted had not all the references I wanted.

In regard to atresia of the cystic duct: it was not considered, likewise permeable strictures of the common duct were not included, but those that were impermeable.

OBSTRUCTIONS OF THE COMMON BILE-DUCT, WITH REPORT OF CASE IN WHICH WERE PERFORMED (a) CHOLECYSTOSTOMY, (b) PARTIAL GASTRECTOMY WITH POSTERIOR GASTRO-INTESTINAL ANASTOMOSIS, (c) CHOLECYSTENTEROSTOMY AND ENTERO-ANASTOMOSIS

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The problem of recognizing the different varieties of obstruction of the common bile-duct is an important one. The principal kinds of obstruction result from—

INTRADOCHAL OBSTRUCTIONS

Acute and chronic catarrhal cholangitis,
Suppurative cholangitis (rare),
Gall-stones; rarely the presence of parasites,
Congenital obliteration of the bile-ducts,
Rarely a syphilitic lesion.

EXTRADOCHAL OBSTRUCTIONS

Localized peritonitis following duodenal ulcers,
Tumors, principally carcinomas,
Movable kidney.

Gall-stones Obstructing the Common Bile-duct.—The most common obstruction of the common bile-duct is gall-stones. When gall-stones are in the common duct "the frequent attacks of pain are usually less severe than when they are in the cystic duct; the pain

also is in the epigastric, rather than in the right hypochondriac, region, and passes through to the right dorsal lumbar region, rather than to the right infrascapular region; and the tender point is found between the umbilicus and the ensiform cartilage, rather than between the ninth costal cartilage and the umbilicus, as in ordinary cholelithiasis." (Robson.)

One of my patients, a man aged about 55, had paroxyms of chills, fever up to 104° and sweating, jaundice varying in intensity, pain, and gastric disturbance.

Ecklin, in a review of 172 cases of obstruction of the common bile-duct by calculi, found that in 34 cases the gall-bladder was normal; in 110 it was contracted; and in 28 it was dilated.

Of 139 cases of occlusion of the common duct from other causes, the gall-bladder was normal in 9, shrunken in 9, and dilated in 121.

Stricture of the common bile-duct may result from ulceration and cicatrization, leading to adhesions and partial, or rarely complete, permanent closure of the duct.

Obstruction of the common duct is rarely congenital.

There may be obliteration of the excretory apparatus of the liver. Dr. John Thompson found 49 cases in the literature. The Museum of the Royal College of Surgeons has a specimen in which the terminal two inches of the common bile-duct are represented by a fine, impervious fibrous cord. Other similar cases are reported. Cysts containing bile occasionally develop above the obstruction.

Pancreatitis is a not uncommon complication of obstruction of the common duct and cholelithiasis. Mayo states that in a review of 1500 cases of biliary concretions, 86 were complicated with pancreatitis. Cholangitis and pancreatitis may be the result of a common infection. A stone in the ampulla of Vater may result

in pancreatitis. Chronic induration (sclerosis) of the head of the pancreas, the result of a chronic inflammation, may cause stenosis of the common bile-duct. (Bland-Sutton.)

Cancer of the head of the pancreas is prone to obstruct the common bile-duct and result in jaundice. Carcinoma of that portion of the gland is said to be six times more frequent than cancer of the tail of the pancreas.

Localized peritonitis following duodenal ulcers may, as in the case reported, cause partial permanent occlusion of the common bile-duct.

Obstructions due to Carcinoma of the Common Bile-duct, Etc.—Progressive emaciation, jaundice, and, occasionally, enlargement of the gall-bladder are symptoms, especially if they occur in advanced years, suggestive of cancer of the bile-duct. (Gall-stones may be associated with carcinoma, as occured in two of my cases.)

When the ampulla of the common bile-duct is affected with carcinoma, it causes not only obstruction of the bile, but also of the pancreatic secretion.

To diagnose the condition accurately is difficult, as the symptoms are very similar to those produced by cancer of the head of the pancreas, primary carcinoma of the duodenum involving the bile-duct, and even a biliary calculus impacted in the ampulla of Vater.

The pressure from an echinococcic cyst or cancerous lymph-glands in the portal fissure may produce obstructions of the common bile-duct.

Movable Kidney.—Martin B. Tinker, at the last meeting of the Surgical Section of the American Medical Association, reported two cases of gall-duct obstruction caused by movable kidney. As these cases are not amenable to medical treatment it becomes the surgeon's duty to operate, and relieve, as far as possible, the existing pathological condition.

The method of rotating the liver and exposing the common bile-duct, as advocated by Moynihan, and the technic of drainage advised by Mayo, have greatly facilitated operation and lessened the danger of exposing and opening the ductus communis choledochus.

Cholecystenterostomy. — The indications for this operation are permanent obstruction of the common bile-duct. Mayo Robson in 129 cases of cholecytostomy had 14 cases of permanent biliary fistulæ. With the present improved methods of operating, this percentage is entirely too high. It may be necessary in case of cancer of the common duct, or of the duodenum involving the bile-papilla, or of the head of the pancreas. In my case I performed the operation on account of obstruction due to cicatricial tissue involving the bile-papilla, the result of an old duodenal ulcer, producing thickening of the pylorus and duodenum in the region of the orifice of the common bile-duct.

This pathological condition simulated pyloric carcinoma, but a microscopical examination failed to show malignancy, although it was associated with complete absence of HC1 in the stomach.

The anastomosis was made between the gall-bladder and the small intestine at a point just far enough from the pylorus to avoid tension on the bowel. A lateral entero-anastomosis was made at a point about four inches below the anastomosis with the gall-bladder. No artificial aids, such as Murphy's button, were necessary. The opening in the small intestine and a corresponding opening in the fundus of the bladder were united with Pagenstecher's linen by means of a modified Connell suture. Intestinal clamps, protected by rubber tubing, were used to hold the gall-bladder and intestine while suturing these structures.

REPORT OF CASE

Man, aged 52 years, consulted me in March, 1907, complaining of chronic stomach trouble. He was con-

Fig. 1. (After Mayo.) Showing the method of resecting the pyloris and the application of forceps to the proximal end of the stomach.

Fig. 2. (After Mayo.) Showing the sutured duodenum and the method of closure used in resecting the stomach.

Fig. 3. Showing the posterior gastro-intestinal anastomosis to the remaining portion of the stomach, the cholecystenterostomy and the entero-anastomosis.

siderably emaciated and jaundiced, and showed malnutrition. He had pain over epigastric region and some tenderness over the region of the gall-bladder.

A clinical examination of the gastric contents after a test-meal showed the absence of HC1.

As he received practically no relief from prolonged previous treatment I advised operation.

The temperature chart, on admission to the hospital, shows pulse 92, respiration 24, and temperature 100° F.

Operation.—March 22, 1907. Laparatomy incision through the right rectus muscle near the region of the gall-bladder. Stomach explored and palpated. It showed a mass about as large as a hen's egg near the pylorus simulating malignancy. I opened and drained the gall-bladder.

A few weeks later the patient, knowing the condition of the stomach, desired a partial gastrectomy, which I performed, using a modified Mayo method with posterior gastro-intestinal anastomosis.

The patient made rather slow but satisfactory recovery from the operation, but at intervals after the lapse of several weeks the bile would again force its way through the cholecystostomy wound. To prevent the liability to a permanent biliary fistula, due to the obstruction of the common bile-duct on account of adhesions and localized peritonitis associated with a chronic catarrhal duodenitis, I performed a cholecystenterostomy and entero-anastomosis. The patient made a good recovery and has since gained about twenty pounds.

A microscopical examination, made by Dr. S. Paul, pathologist to St. Mark's Hospital, of the removed portion of stomach and upper end of duodenum, showed a duodenal ulcer, but, although this mass looked suspicious of malignancy, it proved to be the result of

chronic inflammation due to the ulcerated duodenum.

Doctor H. S. Scott assisted me in the operations.

The accompanying drawings illustrate the operations.

REFERENCES

Moynihan.—Abdominal Surgery.
Binnie.—Operative Surgery.
Bland-Sutton.—Gall-Bladder and Bile-Ducts.
Mayo Robson.—Gall-Bladder and Bile-Ducts.
Osler.—Practice of Medicine.
Eichorst.—Practice of Medicine.
Anders.—Practice of Medicine.
Maylard.—Abdominal Pain.

THE USE OF HARRINGTON'S SOLUTION IN THE TREATMENT OF SUPPURATIVE INFLAMMATIONS OF THE KNEE-JOINT, WITH REPORT OF AN ILLUSTRATIVE CASE

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It has been proven experimentally and clinically that Harrington's solution will kill all of the common germs met with in surgical practice in from twenty seconds up to one minute; and it does not kill the tissues, that is to say, it is not caustic. After thorough washing of the hands in hot soap-suds and then immersing them for two minutes in Harrington's solution, if cultures are taken there should be an entire absence of growths. Even when there is no preliminary washing of the hands before their immersion in the solution for two minutes, the results are remarkable. Harrington says: "I have repeatedly soaked my hands (without preliminary scrubbing) for two minutes, and then have had plantings made from material removed from about each nail and from scrapings of the skin of each finger, and from the palm. Occasionally I got a growth, but as a rule every tube of bouillon remained clear and sterile."

Now, first, if we have to deal with an infected wound, all of its surfaces permitting being laid bare, so as to admit of the removal of the infective products and more or less destroyed tissues; second, if we have

at hand a solution which will destroy the germs of the infection, but not injure the healthy tissues; and, if we, in addition, employ free drainage to the whole surface of the wound, the necessary result must be the changing of an infective, perhaps life-threatening, condition to one representing a healthy process of repair.

Briefly, in illustration: A little boy, seven years of age, was brought to me on September 20, 1907, with the following history furnished by his father: About August the 15th he had been struck upon the knee by a baseball; there was not much complaint at the time, but four or five days later he began to suffer severely; the joint began to swell, and the child became very ill. The customary general and local treatment was employed. About September 6th a physician made an incision into the joint, and evacuated much pus. Upon entrance into the hospital the child was in a serious state: he was thin, pale, expression anxious; his temperature was high, and the pulse-rate fast; the knee was flexed and there was a short incision on the inner side, from which some pus was running; he was in mortal terror of being touched; and his condition was dangerous. Under ether the knee was cleaned up, and it was found that there was a large reservoir of pus in the upper part of the joint, which the incision did not drain freely. The patella was loose in the joint-cavity, and it was removed. An incision was made directly across into the joint, and the flexion increased to the limit so as to expose the interior freely. Considerable pus escaped, although the preliminary irrigation had appeared to remove all. In other words, the incision opened, as it should, not only the extensive synovial membrane freely, but also its pockets. Much necrotic tissue was removed with scissors and forceps. Two high lateral incisions were added so as to better drain the upper cavity of the joint, and the suprapatellar bursa, which freely connected with it. After thor-

ough irrigation with hot normal salt solution and dry sponging, the cavity of the joint was filled with Harrington's solution, and all exposed parts covered with gauze saturated with the solution. The gauze and the solution were removed after four minutes, and all parts gently irrigated with sterile water and dried. The wide-open wound was packed tight with iodoform gauze. Heavy dressings were applied and bandages so as to hold the leg in its forced flexed position.

Result.—The boy's general condition changed wonderfully; the pain disappeared, the pulse dropped, the temperature fell, and he began to eat. For the first time the dressings were removed on the tenth day; there *was no pus, not a drop* in the joint, but it was filled with beautiful granulations; on the edges of the two high incisions, made to better drain the upper part of the joint, there was a little mild infection. The knee was straightened, and the wound repaired. The edges of the flaps were thick, and the skin retracted so that nice, accurate coaptation of the skin edge was impossible. The second dressing was about one week later, and showed absolutely no infection anywhere. The boy left the hospital after a stay of seven weeks. He walked around the ward two weeks before going home, wearing a posterior splint to prevent a tendency to flexion. The little fellow could flex the knee somewhat, but could not extend it. I am hopeful that in time this will improve. Three days ago we learned that he was getting along nicely.

Harrington's solution acted in this case as I have never seen any other act in similar cases, although, of course, we recognize that the incision employed is the best for complete drainage of the knee-joint, and drainage is the *sine qua non.*

Two weeks ago last Saturday I did a similar operation for a man suffering with chronic gonorrheal inflammation of both knee-joints. He had been under

observation in the hospital for many months. Only one knee was operated upon. The dressing was first changed upon the thirteenth day, and the limb straightened. The wound was ideal in appearance, and I think the outlook is good. I will report the case later.

My experience with Harrington's solution is not very great, but we use it in infective wounds where it is applicable. After thorough surgical cleansing of a wound or abscess-cavity, the solution is allowed to remain in contact with all its surfaces for from three to five minutes; it is then irrigated or sponged away, and the particular wound dressed as required.

Any one who will try Harrington's solution as indidicated will like it. It has, besides its proven antiseptic property, the power, when applied to a raw surface, to produce a copious discharge of serum, thus aiding the washing away of noxious elements from a wound.

DISCUSSION

DR. CHARLES H. MAYO (Rochester): I wish to emphasize the value of Harrington's solution as an antiseptic. While, apparently, it is an irritating antiseptic, it is one of the best and least destructive we have in the care of suppurating wounds.

Had the doctor been familiar with the literature, he might have called it the Hippocrates-Mayo operation. I wrote up this subject, as I was not able to find anything about the method I used, with the exception that amputation was advised in the severe types of suppurating knees. The article will be found in the Annals of Surgery, away back in the 90's. As I say, at that time amputation was done for the worst types of infected knee. It seems to me that an incision extended around two-thirds the front of the knee leaves practically everything of value in the posterior part of the joint, but there was nothing in front of that incision which would in any way be harmed, except the extensor tendon. At that time I reported the results I had obtained in the cases I had operated on. In the case of a little boy, I went through the patella and opened the joint, and this was before Harrington's solution came out.

I washed out the joint with pure carbolic acid, followed by

alcohol, and later kept it wet with a boracic-acid pack and iodoform, the latter being greatly in vogue at that time. I can say to the doctor that the little boy will get a useful leg, with at least two-thirds normal motion. I have had three of these cases, and all did well.

DR. B. B. DAVIS (Omaha): Through the courtesy of Dr. Summers I had the pleasure of seeing this patient a short time after the operation, and the result was certainly a beautiful one.

In regard to the effect of the Harrington solution in these cases: I have not had much experience with it, and I do not doubt but that it is a good antiseptic; but in this particular case of Dr. Summers, I have a strong suspicion that it was his thorough work in opening very widely and cleaning out the joint at the beginning to which the excellent result can be attributed.

DR. T. C. WITHERSPOON (Butte): I want to call Dr. Mayo's attention to the fact that he left out one name. Probably this is the Mayo-Schede operation that has been described. Schede, I believe, was the man who first proposed transverse incision of the knee, sawing through the patella, widely opening the knee-joint, and packing the cavity with iodine in some form. He obtained the same sort of results as those that have been mentioned. He left the pack in for twenty-four hours and then removed it, closing the major part of the wound and simply draining laterally. He made an incision, which would extend beyond the middle of the joint, on either side, so that he could get good drainage afterward. I think, therefore, to Schede belongs the credit of first having called our attention to the value of that wide-open, transverse knee-incision and the packing.

DR. SUMMERS (closing the discussion): I had heard of this method before, but whether Dr. Charles H. Mayo had done this incision first or not, I did not know. I did not want to bring it up, as I think it is immaterial who did it first. It is the best we have. I referred, not so much to the incision, as to Harrington's solution. It is a simple affair. I have cut into many of these joints and washed them out, and it was simply remarkable to me to see the beautiful appearance of the granulations and the complete absence of any sign of infection. This gonorrheal joint I cut into the other day was a nasty thing, and when it was dressed it had the same appearance as the joint of the little boy. The man is at present in bed, and I am not prepared to say what will be done in the future, but the boy is walking around.

REMOVAL OF THE WHOLE OR PART OF THE HUMERUS

St. Elmo M. Sala, M. D.

ROCK ISLAND, ILLINOIS

Removal of the whole or a part of the humerus is a comparatively safe operation, and one which should be carefully thought of in all cases where amputations were formerly the first aid to the injured in serious disturbances of the humerus. The literature has been very lame as regards this trick in surgery, and it sadly needs doctoring. Too many arms have been sacrificed, in the past, that might have been saved, had the surgeon cared to try an extirpation of only the diseased portion of bone. Most any kind of an arm is better than no arm. Before the days af aseptic surgery there was possibly some excuse for amputating everything in the shape of an arm that looked bad, but to-day, with the aid of aseptic and antiseptic methods, we are expected to attempt greater feats in surgery. Some of the things that are being done to-day by the modern surgeon, are seemingly almost impossible. When we come to think of man existing without the upper portions of his esophagus and trachea, and all the larynx gone, or with his entire rectum removed, or with only one kidney, or with no urinary bladder, etc., it would appear that nothing is impossible to surgery.

That it is possible for a whole or a part of the humerus to be extirpated, and the patient given a useful hand and forearm, is beyond doubt. One-third of the

upper end of the humerus may be removed, and the patient appear as though nothing had ever happened to the upper extremity, except shortening on that side. The whole humerus may be removed without serious disturbance to the hand and wrist, especially if care has been exercised in saving the musculospiral nerve in its separation from the bone. It is such an easy thing for the modern surgeon to amputate at the shoulder or below, that we can excuse the older surgeons for not attempting the more difficult operation of extirpation. Arms were many times sacrificed when they might have been patched up and made useful members.

Speaking of patched up, reminds me of a case on which I recently did a perineum and cervix operation, and also removed the appendix and both the tubes, and in our work inside the abdomen discovered an impacted gall-bladder filled with calculi. I deferred operating on the gall-bladder about three weeks, so when it came time to inform the woman of the necessity for another operation, her husband was in the room, and she said: "Old man, it would have paid you better to have gotten a new woman than to have had me patched up." In our case, no matter how good a new arm might be, it would hardly equal one of your own, even though it were patched up. When it is possible to restore an arm to nearly its normal usefulness, or to even one-tenth of its former or normal usefulness, it seems well worth the effort.

CASE 1.—The first of the two cases I wish to relate, was operated on some thirteen years ago. The patient struck her shoulder on a door when passing through it some time previously, and soon developed inflammation and necrosis. The bone continued to decay, and it became necessary that something be done. I sent her to the hospital, and it being a charity case she came under the man on duty at that time. Before going,

however, I had told her that the top of the upper bone in her arm could be removed, and that if this was not successful, then the arm would have to be amputated. This seemed to meet with her approval, and she went to the hospital and was examined by the doctor in charge, together with two surgeons, after which they retired to the hall adjoining the patient's room.

The doctor in charge said that it was impossible to save the arm, and that it would have to come off, and that they would take it off next morning, at nine o'clock. The patient overheard their conversation, and left the hospital before the operation was to take place. She afterwards related her experience at the hospital, and asked me if I would not do, at her home, the operation I had suggested, adding that she would like to save her arm if possible. I operated on her at her home the following day, and removed five and one-half inches of the upper end of the humerus through an incision over the middle of the deltoid, the muscle being split from the acromion process down its course about five inches. The periosteum was denuded from the bone, and the bone severed five and one-half inches from its upper end. She made an uninterrupted recovery, and has an arm some three inches shorter than the other arm, but it is a very useful arm. She is able to do all her house-work with it, and can practically get it in any position except up over her head, and she makes a very good effort at that. It is now some thirteen years, and the arm has never given her any trouble. It is certainly much superior to no arm. Being the main support of her small children, the arm has come in very handily. In her case, on account of the great amount of pus, the wound was left wide open, and packed full of iodoform gauze, and it healed very kindly.

CASE 2.—This case was a man, aged 30 years, who, at ten years of age, met with an accident that necessitated amputation of the right femur about five inches

below the great trochanter. Some time in January, 1906, he fell, striking his left arm near the shoulder against a log. It became sore to the touch at once, but did not give him much trouble until about the middle of February, of same year, when it became very painful. He was brought to the hospital and operated upon on March 5th, when we found the bone in two parts, with extensive necrosis. At this operation, the upper four inches of the humerus was removed, and an attempt was made to save the lower part by removal of the decayed bone. Necrosis continued down the shaft, and it became necessary to remove the balance of the humerus. This was done on April 17th, of the same year. In place of the lower end of the humerus a quantity of Morhoof's bone-plug was introduced, this bone-plug extending up from the elbow about four inches. The patient made a rather poor recovery from the operations on account of a very extensive exudative bronchitis, and on account of being very frail and only four-fifths of a man to begin with. He died on August 2d, about four months after the last operation, from an empyema in the left pleural cavity, about a pint of pus being removed from the chest a week before death. Whether the empyema was metastatic, due to the bronchitis, or was a part of the original traumatism, was never determined. His sputum and the pus from the arm were examined several times for tubercles, but none were found. After complete removal of the humerus, the patient was able to hold a tumbler of water in his hand, and drink it, thus demonstrating beyond a shadow of a doubt some of the possibilities of an arm without any bone in it above the elbow.

The incision in this case for the upper part of the bone was the same as that in the former case. The incision for removal of the balance of the humerus was downward on the posterior part of the arm, splitting the fibers of the triceps, and ending at a point midway

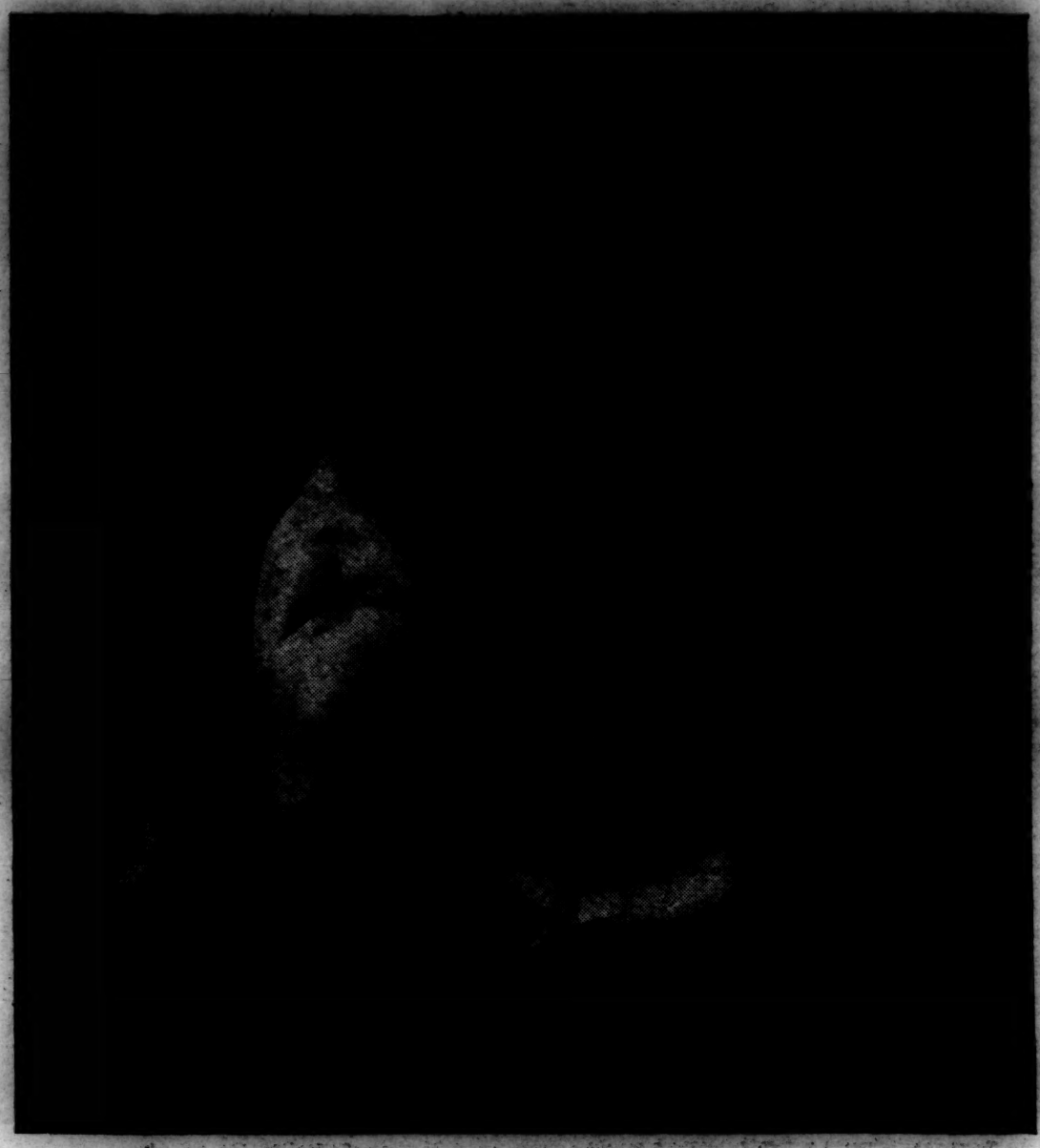

Fig. 1. Showing the arm flexed at the elbow.

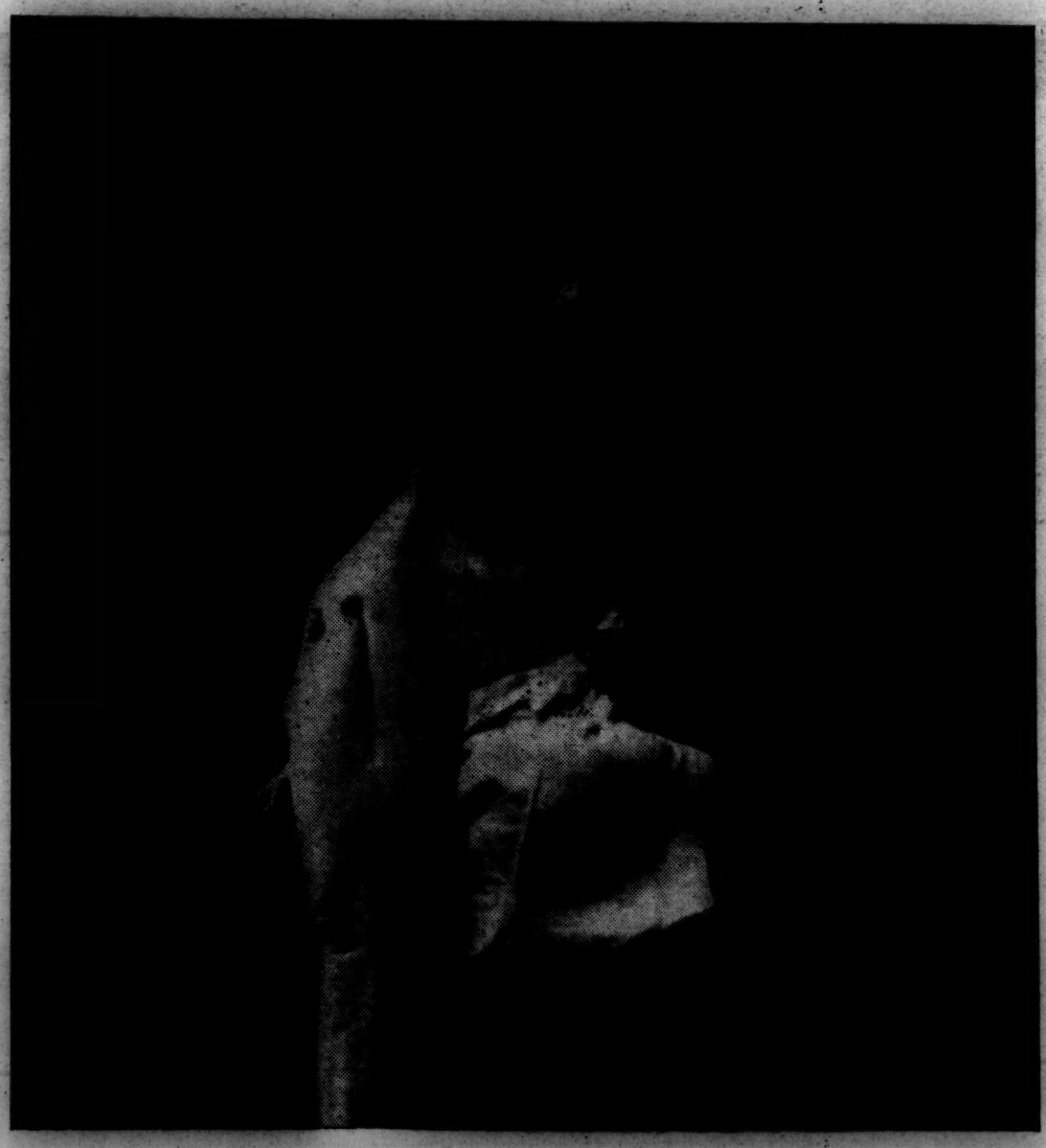

Fig. 2. Showing the arm extended and holding a fifteen-pound dumb-bell.

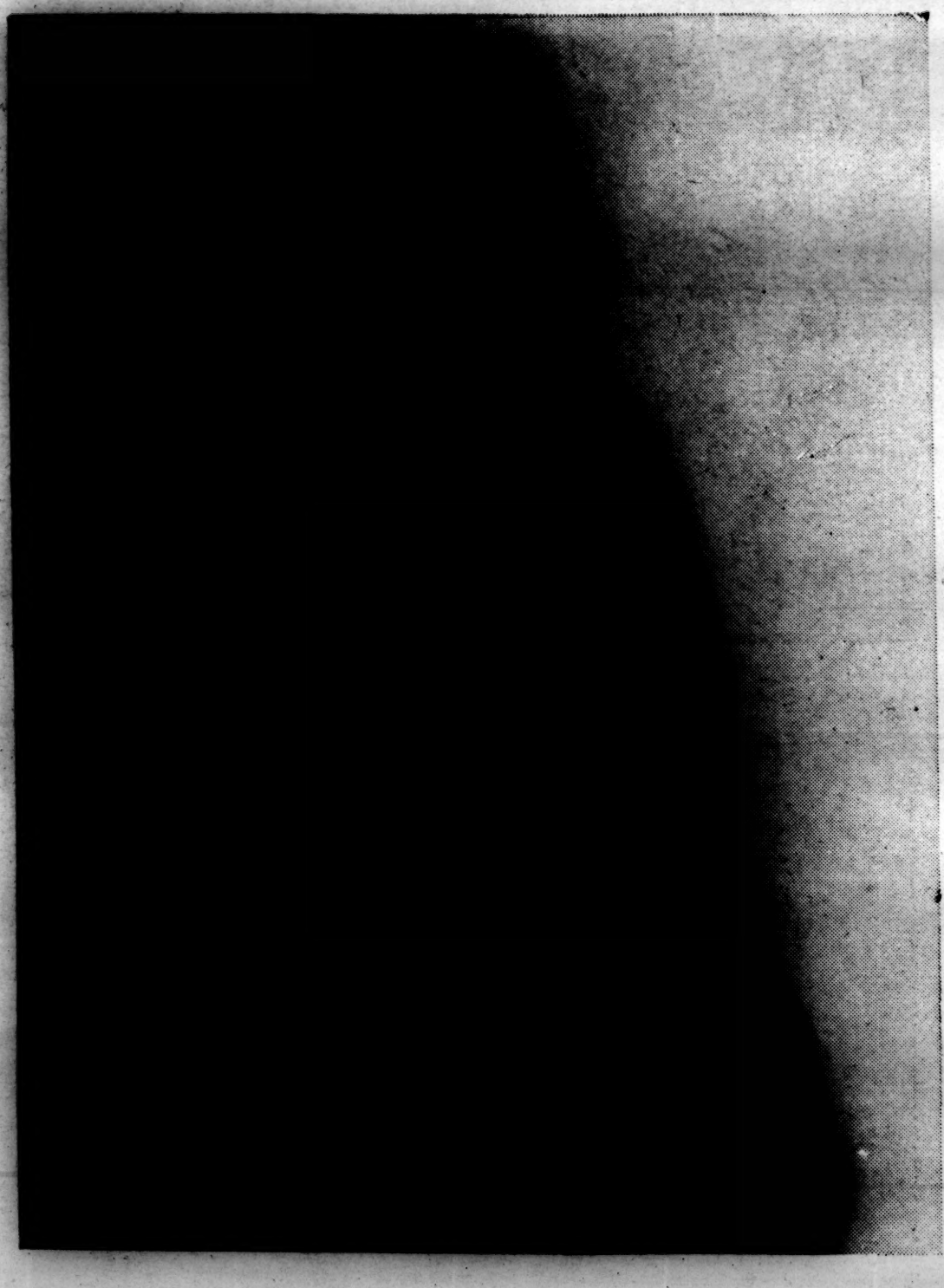

Fig. 3. Skiagram (slightly retouched) of bones of shoulder and upper arm, showing 5½ inches of the humerus removed.

between the olecranon and the external condyle of the humerus. It was necessary to make some lateral incision over the posterior surface of the elbow-joint, in order to facilitate the disarticulation. Care was exercised not to injure the radial and ulnar nerves, and, when possible, the muscles were split rather than cut. The periosteum around the lower end of the humerus was fairly good, and the bone-plug was evidently a serviceable agent in helping to retain the normal contour of the arm.

The incisions for removal of the lower portion were sutured, but that for the upper was left open and packed. While this case was hardly a fair one on which to judge the merits of the operation, or the possibilities of an arm without any humerus, yet it is a positive demonstration of obtaining a useful hand and forearm without any humerus. With a whole man to begin with, and one in good health otherwise than his arm, there can be no question but what an arm without any humerus can be fixed up to do fairly heavy work.

The accompanying illustrations show the condition of arm in Case No. 1, as seen with the *x*-ray, and as it appears in two photographs of the patient. In the one she is holding Binnie's "Operative Surgery" with the arm flexed at the elbow. In the other the arm is extended, and lifting a fifteen-pound dumb-bell. This picture also shows the incision to very good advantage. The skiagram and photographs were taken December 26, 1907, some thirteen years after the operation.

DISCUSSION

Dr. Roland Hill (St. Louis): Dr. Sala's paper shows what can be done in the way of conservatism in the treatment of lesions or injuries of the humerus,

About two weeks ago I presented a case to the St. Louis Medical Society in which the upper part of the humerus was involved, and which was removed. This case was that of a man who had been taken ill in 1902 with a septic condition

involving the upper part of the humerus, and also involving the glenoid part of the scapula. In the winter of 1905 he came to the city (St. Louis), and Dr. Morfit opened the joint and removed some dead bone from the upper part of the humerus and also from the scapula. After five weeks he returned home in a much better condition, but in the summer he became septic again. He came to me in July. He had a constant discharge of pus and was septic. I opened the parts freely and removed the head of the bone, cleaned out the cavity thoroughly, and packed it. He improved very much and went home, but the joint did not heal up. He was having a constant discharge, and came back in March, 1906, with the idea of having the arm removed. At this time I determined to make one more effort to save it, and opened it up, curetted out the diseased tissue, and found there was a little more necrosis of the neck of the bone extending down to the medullary cavity. I thoroughly dried the cavity and sterilized it with carbolic acid and alcohol, and filled it with the Moorhof bone mass. This arm was not dressed again for a week, and at the end of that time there was nothing more than an iodoform stain on the dressing. The wound healed up in six weeks and the patient kept the arm in a sling for four months, at the end of which time he was able to use it and has been using it ever since. He is a baker by occupation.

This case illustrates what may be done in cases of this kind.

Dr. W. D. Haines (Cincinnati): I desire to mention a case along the same line where I removed, in 1898, almost the entire humerus of a boy, 10 years of age, who had a number of sinuses along the outer surface of the arm. He was supposed at that time to be tuberculous. His mother had tuberculosis. There was no attempt made in this instance to save the periosteum, but the entire bone was removed down to within two inches of the condyles. He has almost as good use of this arm as he has of the other arm, with the exception of the one function of putting it on top of his head.

Like the essayist and Dr. Hill who has first spoken, I would indorse this method in preference to primary amputation. Amputation may be done later, if necessary.

THE SURGICAL TREATMENT OF BUNION

CHARLES H. MAYO, M. D.

ROCHESTER, MINNESOTA

The discomfort suffered by patients afflicted with bunions is so far in excess of the apparent simplicity of the malady that the disease has come to be a subject well worthy of consideration from a surgical point of view. The condition is usually associated with hallux valgus, and is attributed to various causes, the principal one being the wearing of pointed, short, and tight shoes. Arthritis and gout may be contributing factors in some cases. From the examination of many patients with this trouble, it appears that the peculiar shape of some feet renders them liable to this deformity. The primitive foot was probably used for grasping objects, the great toe being situated farther back, somewhat like, but less marked than, the thumb on the hand, and as is now seen in some of the lower animals.

Confinement of the foot incident to civilization has possibly tended to the advanced position of the great toe, though many feet still present the short great toe with the wide foot in which the second and often the middle toe is the longer. Such feet rarely have the deformity hallux valgus, although some slight bunion may be present, and this regardless of the kind of shoe worn.

The characteristic of the foot with tendency to bunion is, that the great toe when straight is from one-fourth to one-half inch longer than the second

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toe. This type of foot may remain a perfect foot through life, but should it become confined in a pointed-toe, narrow, and especially a short shoe, the leverage action against the inner side of the great toe develops hallux valgus with true bony growth on the inner side of the head of the metatarsal bone, which becomes covered by a bursal layer. This area becomes most painful to pressure, and is liable to special attacks of inflammation. The tendon of the extensor proprius pollicis becomes displaced to the outer side of the joint-area, and with the angulation of the toe its sheath becomes a pulley, which soon gives way to tension, after which the tendon acts to still further increase the deformity.

Many patients have the trouble in so slight a degree that proper shoe-fitting will relieve them. Some secure comfort by wearing special appliances for supporting the toe or protecting the bunion.

Several operations are recommended for the cure of hallux valgus. Resection of the metatarsophalangeal joint is often practiced; also a wedge-shaped or simple osteotomy of the metatarsal bone, which will relieve some cases, but does not narrow the foot or remove the bunion, if it is present.

It is also recommended by some operators to remove the head of the metatarsal, and, to avoid the scar about the inner side of the joint, their incision is made between the first and second toes.

For a number of years we have practiced the following method in operating upon patients afflicted with this trouble, and the regularity of its success leads us to present the technic of the method.

Operation.—A curved incision is made down over the inner side of the metatarsophalangeal joint, the skin being lifted in the flap, which is separated from the bursa. A curved incision "horse-shoe" is now made around the bursa with its base forward left

Fig. 1. Hallux valgus deformity as shown by photograph.

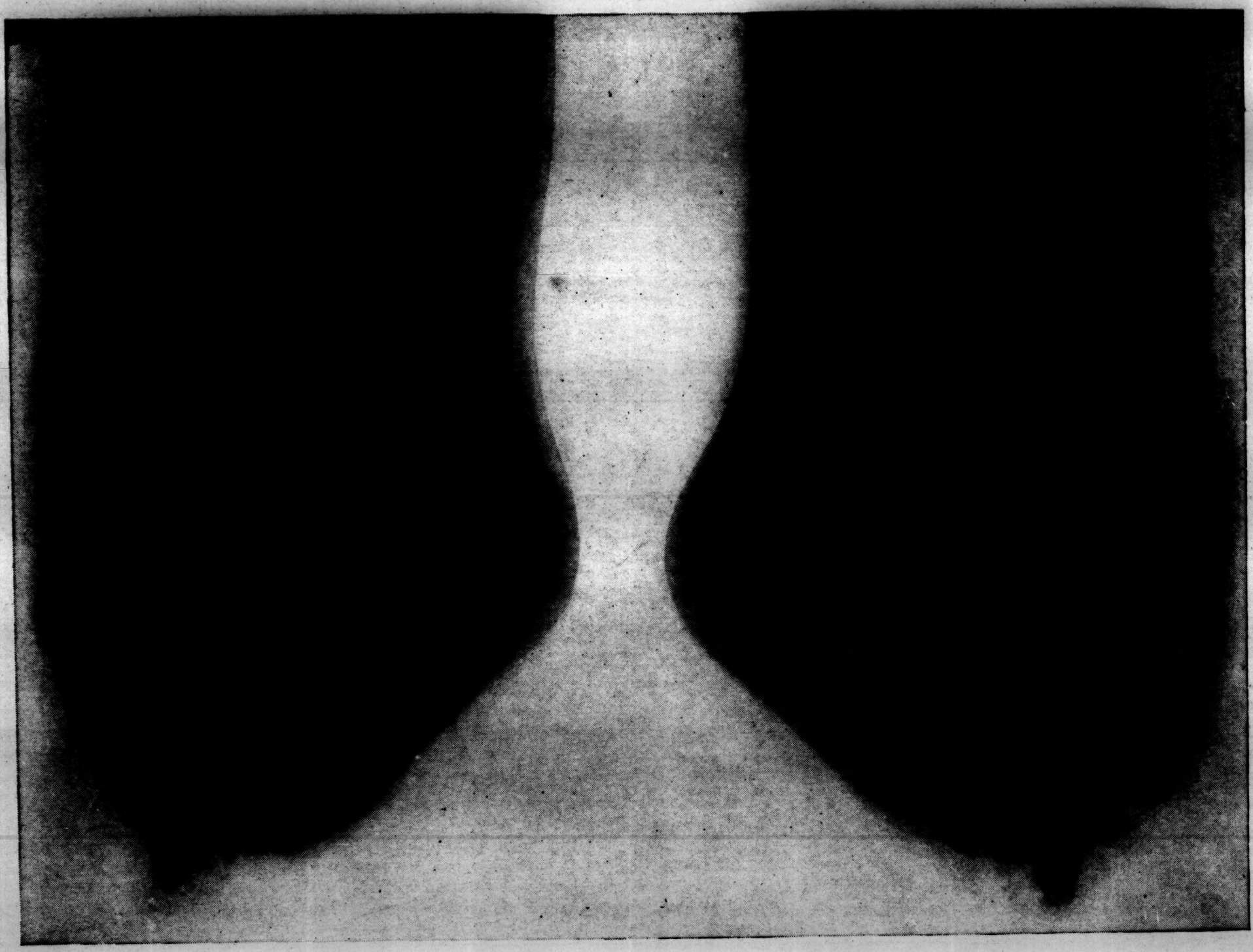

Fig. 2. Deformity as shown by radiograph.

Fig. 3. Showing bony deformity.

Fig. 4. Bone section ready for insertion of bursa.

Fig. 5. Suturing of bursa to develop joint.

attached to the base of the first phalanx, its inner surface being synoveal membrane and continuous with the anterior surface of the joint.

The head of the metatarsal bone is then removed with heavy forceps, the section also removing two-thirds of the anterior portion of the bony hypertrophy on the inner side. The remainder of this projecting bone is cut away to the level of the shaft of the metatarsal. The cut end of the metatarsal bone is now rendered as smooth as possible by Ronguer forceps, and the bursal flap turned in to the joint-area in front of the bone, where it is held in place by one or two catgut sutures. We thus utilize an already formed bursa to secure and maintain a movable joint, which works in a movable splint, the shoe, and thereby secure an immediate result, which is obtained with difficulty in other joints by transplanting fatty tissue into the joint-area to prevent bony unions. It is an operation you are familiar with through the efforts of Dr. J. B. Murphy, who has demonstrated its great value in certain cases where the joints have become fixed by injury, disease, or operation. In some cases the tendon and sheath of the extensor proprius pollicis is best displaced to the inner side of the mid-line of the toe.

Provision is made for drainage by a punctured incision in the base of the skin flap in which is inserted a doubled catgut strand. The skin incision is now sutured in place with horsehair or catgut. The dressing is a pad of gauze wet in 70 per cent alcohol placed between the great and second toes. The anterior portion of the foot is covered with a dressing, which is moistened with the same solution at intervals during the first few days.

With ordinary care in protecting the wound these patients are often much better able to go about within two weeks than they were before the operation. It

frequently occurs that they are not kept in the hospital even during convalescence.

The motion becomes nearly perfect. The great toe is shortened to a reasonable degree, somewhat narrowing the foot at its widest line, a factor of importance in the prevention of recurrence. The bearing surface for support is excellent, as the under side of the joint-floor is not disturbed, and the cushion beneath with its sesamoid bones is left intact.

Theoretically it could be said that the scar is badly placed and would be subject to pressure from the shoe. Practically this is not true, as we have found from operating upon 65 cases during the past eight years according to this method.

DISCUSSION

Dr. S. C. Baldwin (Salt Lake City): I think this method is the one that is very largely followed by most orthopedic men in doing this class of work. I believe it is not uncommon to get movable joints after the removal of almost the entire joint surface. Even in the larger joints, with a little care we can get a useful, partially movable joint.

Dr. Mayo's description of his method of operating is interesting, and I have no doubt it will give as good results as can be expected, with as little damage to the parts, but I think the necessity exists in almost all cases of bunions, with hallux valgus, to remove the head of the bone, and it will be necessary to remove the head of not only one, but possibly very often both bones, because if the condition has existed for any length of time the trouble almost always involves both of the bones forming this joint.

Dr. Howard Hill (Kansas City): I have had some experience in treating cases of hallux valgus, and have followed Fowler's method. He makes a point of considerable interest with regard to shortening dorsal extension, and if you will carefully examine these cases you will find, usually, that the extensor tendon is shortened, so that it is generally attended to at the same time. One advantage of Fowler's operation is that the ligaments are all cut, so that there is no danger of getting a fixed joint afterwards.

Dr. Mayo (closing the discussion): There are only two

Fig. 6. Radiograph of result nine months after operation.

points I wish to call attention to. The first one is this: we know that the big toe will probably develop a bunion if it is subjected to the right kind of irritation and pressure. The next point is the saving of the bursa, which has been sacrificed in most of the operations, and turning it into the joint and saving practically the complete synovial surface, preserving the synovial surface of the first phalanx, and the shortening is sufficient to bring the big toe back to less than the length of the second toe, preventing pressure, which would cause a recurrence of the condition.

THE EARLY RESTORATION OF FUNCTION AFTER EXCISION OF THE ELBOW-JOINT IN TUBERCULOSIS CASES

GILBERT GEOFFREY COTTAM, M. D.

ROCK RAPIDS, IOWA

Some months ago I found myself confronted by the problem of dealing with a case of tuberculosis of the capitulum humeri with ankylosis of the elbow-joint, the circumstances of the patient requiring the earliest possible return of the joint to functional usefulness. Failing to receive any encouragement from a fair trial of the usual conservative measures, I decided to wait no longer, but proceeded to excise the elbow through Kocher's incision, immobilizing the arm in plaster-of-Paris in full extension in the angle of deflection for a period of three weeks, after which active movement to the fullest extent was both permitted and encouraged, with the result that the patient, a young farm-laborer, was able, from the eighth week after the operation, to do the full work of his occupation.

This is but one case, yet it forces me to wonder, as I look back upon it, whether, by revising our accepted ideas upon the excision question along lines somewhat similar to those just outlined, we could not succeed in making such results the rule rather than the exception, with commensurately great advantage to a peculiarly unfortunate class of patients.

Tuberculous disease of the elbow, as in other parts

of the body, is most common among the ill-nourished, the poorly housed, and the imperfectly clad, the neediest element of every community and composed of those who particularly require the unimpaired use of their physical equipment to aid them in their struggle for existence and the prolonged deprivation of it, either by the disease or its remedy, is a serious matter, both for the individual and for society at large. To be able to lessen the period of inactivity from months or years to a matter of a few weeks at most, and discharge the patient with a good, useful arm in the majority of instances, would be a most desirable state of affairs, and the possibility of it encourages me to dwell briefly upon the salient points involved.

In the first place I think that in the past we have been a little too prone to procrastinate; to resort to excision long after it has become plainly apparent that all other means have failed and when, not only the osseous tissues, but also the surrounding soft parts, have undergone such pathological change as to seriously impair their functional activity. To expect good joint-action after excision in such cases in manifestly unreasonable, and the logical corollary is that, to ensure good functional return we must operate early at least as soon as the disease is definitely recognized and has failed to be arrested by a reasonable amount of so-called conservative treatment.

Again, we must abandon obsolete methods of operating, which take no thought of important muscles and nerves. Most writers seem to believe and teach that flail-joints after excision are due to the removal of too much bone, but I venture to suggest that they are almost always of a paralytic nature, due to the division of nerves or muscles, certainly not to the loss of bone when such cases occur as that of Dennis[1], who reports a good, competent joint after removal of

four inches of the lower end of the humerus. I urge, therefore, that the methods of v. Langenbeck, Ollier, Chassaignac, Park, Vogt, Hueter, and Moreau, while good and useful in their day, be now relegated to the pages of history. In Kocher's we have an incision which is peculiarly well adapted to favoring the early return of function, since it is planned to avoid injury to all soft structures that are essential to the integrity of the joint-control. Again, the extended position offers several distinct advantages. It allows the widest possible separation of the sawn ends, so that the arm can be immobilized for a considerable period without risk of bony ankylosis. Jacobson wisely decries early passive motion, in the following words: "If the surgeon pictures to himself what is going on under the skin he will recognize that every time early passive movements are practised, the uniting structures, as yet richly cellular with vessels or embryonic tissue, are injured, and fresh exudation and hemorrhage follow, which must all be absorbed or organized."[2] In the extended position the weight of the forearm tends constantly to maintain the proper distance between the ends of the bones, while the flexed position has the opposite effect. In the extended position the carrying angle can, and should be, maintained, not only during the period of immobilization, but thereafter whenever the arm is not in use, by the adaptation of a light, strong appliance at the elbow. In this way the joint is trained, so to speak, in a useful position.

Concluding, I emphasize these points:

1. Early operation, i. e., as soon as it is reasonably certain that the disease is present and not yielding to conservative treatment.

2. Choice of a method of operating that preserves the integrity of all important nerves and muscles.

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1. Annals of Surgery, vol. xxviii, p. 256.
2. Operations of Surgery, vol. i, p. 91.

3. Removal of sufficient bone to ensure free mobility.

4. Immobilization in the extended position, with maintenance of the carrying angle.

5. Active motion at the end of three weeks.

ARTHRODESIS AND TENDON TRANSFERENCE IN PARALYTIC CLUB-FEET

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Having been early in copying the work of the world's leading orthopedists in the treatment of paralytic club-feet, your essayist has accumulated experience which may be of some value to those in the formative stage, or to those who do surgery of this character only occasionally, without having had any considerable orthopedic experience. No claim of originality is made, and due acknowledgment is extended to all who have followed Albert in doing arthrodesis to improve the usefulness and sustaining power of paralyzed members; and to Nicoladini and others in tendon-grafting and tendon-transference, to appropriate to best advantage the remaining muscular power. Perhaps the greatest good to come from the rediscussion of subjects which are not original with a writer, is that it serves to disseminate our knowledge among our fellows and the great numbers of general practitioners, who have the first observation of cases and who are the court of first appeal, which frequently decides, for good or for ill, the course of the cases.

Paralytic or acquired club-feet is a most common deformity and is attended with varying degrees of disability, and the majority of cases are amenable to a much larger measure of relief than is generally recognized, by either physicians, general surgeons, or even some orthopedists.

For many years the common practice was to correct the deformity in a paralytic club-foot, without any attempt to correct or overcome the tendency to return of the deformity, except by a brace, which is not only undesirable but impracticable, because it is usually inefficient, or is soon rendered so by wear, breakage, neglect, or the growth of the child. Return of the deformity was, of course, inevitable. The discouraging effects upon parents only served to resign them to the unfortunate condition. In general, the bad prognosis in these conditions, has served to pervade both lay and professional minds with a hopelessness that causes a large proportion to abandon treatment or to seek the relief which a brace will afford. Their advisors oftentimes having no conception that an operation might furnish a large measure of relief.

It is also unfortunate that so many years of lameness and disability are spent, to the detriment of the individual, in want of use, in favoring secondary deformity, and lack of development. The early establishment of corrected conditions is most useful in securing growth, development, and the largest possible usefulness. The pernicious effects brought about by over-action of strong muscles and the overstretching of weak ones, serve to exaggerate the deformity, and are, indeed, solely responsible for it. The maintenance of a member in a normal position by joint-fixation, limits the action of the stronger muscles and protects the weaker, and the supplemental action of transferred muscular power serves to maintain a more balanced function. The early correction of the position and the restored balance of muscular power, are desirable to hasten early use, and thus gain time, which is an important factor in the growth and development of weakened, though not wholly paralyzed, muscles; and, if other muscles have been utilized and their function transferred, their use and

co-ordination should be established early, while the child has the adaptability peculiar to its age. A gain has thus been made, which, in an older individual, would not be as fully realized. In some older cases there is disappointment, seemingly for no other reason than lack of spirit. The older children and the adolescents who have not learned or who have been deprived of walking, have a fear of falling, in their efforts to walk, which a young child does not possess, and, therefore, they fall repeatedly without discouragement. These older children lose this *vis-a-tergo* if surgical relief comes too late. This applies to the extreme bilateral cases.

Tubby and Jones, in the preface to their admirable treatise on "Surgery of the Paralyses," say: "The newer procedure of muscle-grafting, tendon-transference, and arthrodesis, has widened the scope of surgical treatment, both of paralysis itself and of its resulting deformities, and promises to effect an entire revolution in this branch of surgery."

In the very slight cases of toe-drop, the tibialis anticus transferred to the common extensors, will do much to overcome the lack of action in the disabled extensors. This is both the simplest and the most common procedure. In cases of total loss of the whole anterior extensor group from early paralysis, and where no brace has been worn and a severe talipes equinovarus has been produced in a child of some years, it will then be necessary to do much more,—perhaps the complete removal of the astragalus and the removal of the joint-surfaces from the calcaneocuboid articulation, and the appropriation of the tibialis anticus for the extensors. In very extreme cases of varus, the tibialis anticus is secured to the periosteum on the outer surface of the cuboid, and the tendon of the flexor longus hallucis is brought through the interosseous membrane and attached to the common ex-

tensors. The operation most frequently required, is the production of an artificial ankylosis of the tibio-astragaloid, astragaloscaphoid, and the calcaneocuboid articulations, with the transfer of such muscle-power as is available and necessary to overcome the tendency to the return of the deformity, and to lift the toes sufficiently to prevent dragging.

In bad cases of deformity, usually an evidence of extensive loss of muscle-power, arthrodesis, is positively indicated to fix the position that the foot may easily be maintained at a right angle. This serves to prevent the over-stretching of weak muscles, so destructive to their usefulness, and any appropriated muscles used, do not suffer an immediate handicap; and even though their action may be relatively feeble, yet it may be enough to maintain fair function, balance muscular action, and maintain the position. Less often is it secessary to provide against loss of the posterior muscles of the leg. Calcaneus is a relatively rare form of deformity. It is caused by the loss of the strong calf-muscles, and if this is the sole disability, our task is greater in securing muscular balance than if only part of the anterior group be paralyzed. The posterior tibial, peroneals, plantaris, and flexor longus hallucis have been used singly, or in various combinations, to meet the indications. And, if anterior muscles only are available, the tibialis anticus, extensor proprius hallucis, or a slip from the extensor longus digitorum may be appropriated to such an extent as to get a balanced action. A stiff ankle may be necessary to a more secure and complete result, and the displacement of the foot backwards, according to Whitman, is so valuable a measure that it should always be used. The degree of ankylosis, which is difficult to predict, should vary to suit the needs of the various cases. We should secure complete ankylosis in flail-joints: in general, partial an-

kylosis only, in proportion to the amount of deformity and the tendency thereto.

Wolenberg calls attention to the ill consequences of nerve-division in muscle-splitting, and cautions against severing the transverse nerve communications, which is likely if the muscle is split above its middle.

Lorenz believes that it is time for a reaction in tendon-grafting, he having met with cases where it had been overdone, with results worse than before. There is, undoubtedly, this danger, and it causes us to pause and give heed to the conservative words of Tubby in his Hunterian Oration last year, wherein he states that he feels in attacking paralytic affections, either by tendon-grafting, muscle-transplantation, or nerve-anastomosis, that we are confronted by a most intricate problem; but early results following operative treatment, considering the comparative failure of all the preceding measures, seem to justify a very careful and well-considered trial in suitable cases.

At the Nebraska Orthopedic Hospital, since its opening, in October, 1905, the writer has operated upon sixteen patients, representing twenty-one paralytic club-feet, by arthrodesis and muscle-transference. The ages were from five to twenty-one years. In private practice, an almost equal number have been so treated in a period somewhat longer. In no case was suppuration a factor. Drainage was always used, in the form of gauze, rubber tissue, or combined in the form of a cigarette, that blood, serum, or synovia might find ready egress. This was gradually removed at each daily dressing until all drainage was dispensed with, which was within a week. The discharge of synovia would sometimes continue for from three to six weeks. One gave a slight discharge for three months. All closed without evidence of suppuration. In nine cases of extreme deformity, astragalectomy was done in addition to the arthrodesis and tendon-

transference, and these represent some of the most pronounced improvements, in which crutches and braces have been discarded.

The writer being a surgeon, and a constant user of catgut, this material has practically superseded silk, which was early used in imitation of the orthopedists. The silk, I believe, to be only necessary in tendon-lengthening, according to Lange, and in those cases where the tendon is united under tension to bone or periosteum, as in the transfer of the tibialis anticus to the outer border of the foot, and attached to the cuboid. Fine strong silk, boiled in sublimate, dried, and re-boiled in paraffine (melting-point 55°) immediately before operation, as recommended by Lange, is an elegant suture, easily handled, and free from the larger knots of the finest catgut suture, which must be admitted by all to be objectionable in the delicate work necessary, especially in young subjects. The skin was at the first united by silk, later by horse-hair, and now by plain catgut. The latter has been used most often in the form of a continuous suture, and is now preferred.

Very heavy plaster casts have been applied to permit of large openings for dressings and inspection. Swelling at the fenestra should be controlled by compresses and snug bandaging. The first casts usually remained on for six weeks, when they were renewed for cosmetic reasons. Light weight-bearing was allowed after two months, slight use in walking in three months, and increased or diminished according to their ability to use without pain or evidence of arthritis. The patient should not be encouraged to use the foot if any considerable pain is produced. Usually, no pain or disability from arthritis persisted after four to six months.

This prolonged maintenance of the feet in the corrected position, has worked wonders in producing a

more normal shape to the feet, and with a fixed position there was opportunity for a more normal action of the sound muscles. The weak ones were given a chance, they being aided by the transferred muscles, whose power had been subtracted from the strong group and added to the weaker, thus equalizing the power, balance, and function, and thus lessening and perhaps preventing recurrence.

It can be fairly stated that every case has been benefited in every way. The improvement has been somewhat commensurate with the strength and value of the material to be utilized in the restoration. Most of the cases are too recent for an ultimate estimate. Results promise well, however, and in general are among the most satisfactory in this class of surgical endeavor.

As a rule, arthrodesis is not recommended by experienced orthopedists in subjects under nine years; the best and most permanent results from this part of the combined procedure under discussion, are in subjects above that age. The writer, however, felt impelled to treat his young subjects the same as the older ones, believing that the arthrodesis might better be repeated later, if necessary, to re-stiffen the joints than to deprive them of its unquestioned benefits. This course has seemed justified in the poor cases, in which the period of treatment and observation was limited, and braces were not available nor practicable for a long period. Another explanation also is that the operative surgeon is more impatient for results, and is quicker to do definite things, than the exclusive orthopedist, who seems to have been educated in a school for patience and is willing to wait longer for results. We are therefore reminded of the lines of Pope:

"Avoid extremes, and shun the fault of such,
Who still are pleas'd too little or too much."

CONCLUSIONS

First—Arthrodesis, after resulting ankylosis, holds

the ankle stiff and immobile. The increase of mobility in the anterior articulations of the foot will compensate for the loss of motion in the large articulations of the tarsus. The foot is thus permanently maintained in a right-angle position.

Second—If all of the muscles of the leg are paralyzed, resulting in a flail-joint, the production of a stiff ankle and tarsus is the only practicable procedure, if a foot and ankle are to be made to sustain the body-weight.

Third—Tendon-transference, in addition to arthrodesis, appropriating to best advantage the remaining muscles, enables us to secure the best possible results.

Fourth—Patients should have the benefit of such treatment as soon as the extent of the paralysis is determined.

Fifth—Great advancement has taken place in this branch of surgery. The profession is not fully apprised of this advance. Attention to this subject, therefore, it is hoped, will serve to increase interest in this class of work. The improved prognosis will doubtless result in lessened deformities, increased usefulness, and a more hopeful outlook for those too frequently regarded as hopeless cripples, because the cause is paralysis. The latter idea being too thoroughly ingrafted into both the lay and professional minds.

DISCUSSION

Dr. S. C. Baldwin (Salt Lake City): I want to say a few things with reference to this very interesting paper. Dr. Lord has brought out very fully the salient points in this line of work. There is one thing I think of practical importance that he has spoken of, but in which he and I differ to some extent. He believes in doing this work any time it comes in his way, while I do not believe in doing it very early. I think the teaching among orthopedic men is that the operation of arthrodesis in particular should be done later. Cases from 12 to 20 years of age give very much better results than cases under 12.

My experience has been quite limited in this work, for the reason that, having no public hospital in our city, the patients that come for this kind of work to be done are all private cases, so that we have not the opportunity of doing work for patients of the poorer class. But I find one particular reason for doing the work at a more advanced age is, that the astragalus in particular is more fully developed. There is more bony substance in it than there is in the younger cases, and when that is true we shall get a more stable joint. There will not be so much tissue to remove. It it a very important matter in doing an arthrodesis to remove all the cartilaginous surface, and, as Dr. Lord has said, not only the astragalotibial joint must be stiffened, but the astragaloscaphoid and sometimes the calcaneus. It is not always necessary that this joint be involved in the arthrodesis, but frequently it is.

There is another point of importance, and that is, where you have a flail-joint the anterior muscles and tendons should all be shortened. The question how to do this will be decided by different operators; for instance, I was much surprised to see the way this is done by Codivilla, who is a leading Italian orthopedic surgeon. He dissects out the tendons and ties them with a specially prepared silkworm gut in two places, so that one would think there would be sloughing, and he would get unfavorable results, but he claims to obtain good results, and he has a great amount of work. Other surgeons will stitch the tendons with one thing and still others with another. In these flail-joints you will find that practically none of the muscles are alive, and the tendons will be of little benefit, but the shortening of the tendons will be of considerable benefit. If any of the muscles are useful, I think they are likely to be the posterior muscles.

As to muscle-splitting: I think it is rarely of any benefit, because in all of these cases, even in older subjects, the wasting has been so great that you get very little muscle tissue or the tendons are very small. The splitting is usually done in the tendons, and the anastomosis is made in the tendons which are so small that it is difficult to get a tendon that will bear splitting and have any strength left.

As to nerve-grafting: That is too much in its infancy to speak with any authority as yet, because it has been done so infrequently and with so uncertain results in most cases that it will remain for the future to determine what the prognosis will be.

As to drainage: I think it is usually unnecessary in these

cases, and still I had one case in a girl, 13 years of age, who had absolutely no symptoms, so far as we could learn beforehand, but when we went to pare off the surfaces of the astragalus we found on the anterior end a focus of osteomyelitis about the size of a small marble. This case required drainage, and the patient is still under observation. There is some discharge yet, but in other cases I have absolutely closed the wounds without drainage, not even using as much as a strand of gut.

Dr. Lord spoke of Tubby and Jones reporting over one hundred cases. The probability is that Mr. Tubby's experience constituted but a small number of those cases, because I believe Mr. Jones will probably average seeing twenty-five orthopedic cases where Tubby sees one.

As far as astragalectomy is concerned, I believe it is very seldom necessary and that you will get a much better joint without it.

Dr. Lord (closing the discussion): There are a good many details I did not deal with in my paper because it would have become wearisome. It was my object to deal more with certain phases of the subject than to attempt to exhaust it. As may well be imagined, there is the greatest variation in treating these conditions, and it remains for the operator to determine to what extent the normal muscles shall be utilized to take the place of those paralyzed. It is necessary, for instance, to have a long incision until you have exposed the parts well. One authority has stated that it is desirable to extend the incision to such extent that the muscles to be used may be inspected and thus judge of their function as is evidenced by their microscopic appearance. Paralyzed muscles are always yellow when the parts have undergone fatty degeneration. There may be a few muscle fibres remaining which will functionate. There may be nearly half of them useful in the affected muscles. It is desirable to get good strong muscles if they are expected to perform considerable function in replacing the power of those that have been paralyzed.

Arthrodesis, to be as effective as it should be under these circumstances, should be extensive. The cartilage should be entirely removed by a sharp knife or chisel from every accessible portion of the joint. Where there is considerable correction to be made in the foot, this may be aided by removing cuneiform sections of the articulations, in order to get a more correct position of the foot.

Dr. Baldwin speaks of muscle-splitting as not being neces-

sary or perhaps advisable in these cases. I agree with him as to that, in its application to the leg. The observation of Wolenberg applies to the calf muscle, which is used for taking the place of the peroneal muscles or extensor muscles. It also applies to the same principle used higher up in the thigh, where perhaps part of the biceps is used for insertion in the quadriceps extensor femoris. This is not germane to my paper, but I only want to add that this same principle of tendon-transference applies with particular force to the thigh.

I have had two cases and three thighs where there has been complete paralysis of the extensor muscles and where half the biceps has been used to be inserted into the quadriceps extensor femoris, and where the semitendinosus has been used for the inner side of the thigh. In these cases there was inability on the part of the patients to stand erect. They would immediately fall because of lack of power in rendering taut the patellar tendon. The results were most excellent. Both of these patients were able to stand and walk after that procedure. The girl crawled about on the floor before, and since that time she has been able to walk across the room without the aid of crutches or cane. This only illustrates what can be done for some of these patients; yet I do not wish to pose as an enthusiast. The statement I made in my paper was that this work is encouraging and gives good results, and I expect to enlarge the application of these methods rather than to recede from them. I believe that with further experience there will be more advocates of this method of procedure in clubfoot. It enables us early to dispense with retentive apparatus.

I find it is necessary for me to be somewhat on the defensive when I stated I operated on young subjects. I have found it poor policy to deny any surgical relief I could give a patient simply because I was not ready to do the work. I think it is better to straighten up these young subjects, put them on their feet, and start them out walking with braces, than to ask them to come back at the end of six years. I am aware that most of the authorities do not recommend arthrodesis in cases under nine. I have done it in six or eight cases at least, and I have had no reason to regret it, and these patients are better off than they would have been had I deferred that part of the operation.

THE SURGICAL TREATMENT OF HYDROCEPHALUS

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In presenting to you the following brief remarks upon hydrocephalus considered from a surgical standpoint, I trust that I may find an excuse for so doing in the fact that, while the condition is generally recognized as being beyond the pale of therapeutic intervention, it has not as yet been admitted to the scope of our art, except in isolated instances which in themselves have not been sufficient to clearly point out what benefits, if any, may result from surgical intervention, and therefore it may have some claim upon our attention.

Before we may properly assign ourselves the task of correcting any morbid condition, it is essential that we have a correct conception of the underlying cause or causes of the same. Let us therefore briefly review our present conceptions of the pathology of this condition, in order to evolve the principles which shall guide us in elaborating a plan of surgical intervention.

We must first separate two conditions widely differing in their pathology, which are usually included under the term *hydrocephalus*. In one of these, external hydrocephalus, there exists an abnormal accumulation of fluid in the subarachnoid space, which, in turn, is often dependent upon a pachymeningitis, a cerebral hemorrhage, or a cerebral defect. This form is rare as compared with the other variety, internal

hydrocephalus, and is not associated with the marked pressure-symptoms of the latter. This latter or more usual form, internal hydrocephalus, is the one which will engage our attention. Here the fluid is collected within the ventricles, particularly the lateral, and to such an extent that the intraventricular tension is greatly increased thereby, leading in turn vascular plexus, and that those of the lateral ventricles have a double arterial supply. This would indicate their unusual importance.

Mott, at a more recent time, has sustained the same view. He says: "It is comparable to the amniotic fluid, for true albumin and fibrinogen are absent." This constant secretion and delivery into the ventricles pre-supposes its removal if its abnormal accumulation is to be prevented.

It is maintained that absorption from the ventricles, *per se,* is impossible, owing to the position of the veins in the interior of the velum interpositum; therefore, exit through the normal communications between the ventricles and subarachnoid space constitutes the main, if not the only, avenue of escape, Such avenues of escape are therefore the communication between the lateral and third ventricles, from the third to the fourth by the aqueduct of Sylvius, and from the fourth making its escape to the subarachnoid space through the foramina of Magendie, Luschka, Key, and Retzius.

Hilton, nearly half a century ago, was the first to insist upon the existence of foramina communicating between the fourth ventricle and the subarachnoid space. He reached this conclusion from observation of conditions found in the necropsy of a case of hydrocephalus. The existence of such openings, normally, was at that time doubted by anatomists, but the subsequent investigations by the men whose names are borne by the canals discovered by them, have estab-

lished, beyond question, the fact of the presence of such communications. The fluid, having passed from the ventricles to the subarachnoid space, as is presumed to occur with each cardiac systole, finds its way back into the circulation by way of the veins and lymphatics, or, possibly, as some maintain, by way of the Pacchionian bodies. Therefore, in attempting to account for the accumulation of fluid in the ventricles, it must be found to be to an expansion of the surrounding structures, so that, in the course of the disease, the cranial vault assumes an enormous size and out of all proportion to the rest of the head and body. In the case reported, that of a child of 12 months, the frontal circumference was over 67 cm., with a depth from the top of the head to the plane of the brow of 15 cm.

These measurements, compared with the head of the adult wearing a 7¼ hat, which give a frontal circumference of about 56 cm. and a ventrical depth of about 7½ cm. show a cranial circumference one-sixth greater than, and a ventricle measurement twice, that of the adult. Such distention must imply that the ventricles are immense cavities surrounded by the cerebral structure, which has become greatly stretched and thinned, and lies flattened out against the cranial bones, which, in turn, in trying to accommodate this rapidly developing intracranial mass, become very thin and resilient plates. The widening process also prevents the closure of the fontanelles, which in this case were represented by immense chasms, bridged at points by new centres of ossification represented by Wormian bones.

In considering the pathology of hydrocephalus, a few seemingly well-established facts should be kept in mind, regarding especially the production of the cerebral fluid in the ventricles, as well as its removal from them. This fluid in the ventricles is a true secretion, a view first advanced by Halliburton and later elaborated by Sir Thomas Barlow and Dr. Lees. They

ascribed to the choroid plexus the peculiar function of secreting this fluid continuously. As further evidence, they pointed out that the columnar epithelium of the ventricles is modified so as to assume the character of secreting epithelium where it covers the choroid plexus. Furthermore, they affirmed that each ventricle is provided with its own through conditions which permit of a secretion of fluid in excess of that which the normal openings are capable of delivering to the subarachnoid space, as may happen if the flow of blood in the veins of Galen is obstructed, consequent upon pressure by a tumor; or, again, as pointed out by Schultz, through constriction of the vessels by inflammatory products leading to passive congestion and edema of choroid plexus, any of which conditions may result in an increased secretion, or transudation, into the ventricles. On the other hand, occlusion of any of the normal channels communicating between the lateral ventricles and the subarachnoid space, namely, the foramen of Monro, the aqueduct of Sylvius, the foramina of Magendie, of Luschka, and of Key and Retzius, must lead to a retention within the lateral ventricles of the normal secretion, which would in time give rise to distention of the same in a manner somewhat analogous to retention cysts. The cause of such occlusion may be varied; thus some of the foramina may be absent owing to a developmental defect, or occluded as a consequence of a prenatal meningitis.

However, the most important factor in bringing about such occlusion is in all probability the posterior-basal meningitis from which children may suffer during the early months of life, and while a small percentage of cases may follow from the causes above mentioned, in the main, internal hydrocephalus must be looked upon as due to occlusion caused by inflammatory changes, and this occlusion may exist in any

of the passages between the lateral ventricles and the subarachnoid space, mav be, or due to adhesions between the cerebellum and the medulla.

Hydrocephalus, viewed in this light, must therefore present to the surgeon the problem of establishing a new channel of communication between the lateral ventricles and the subarachnoid space, through which the intraventricular fluid may find exit. This must needs be more or less artificial, for it is hardly probable that our art will become so neglected as to lead to the hope of re-establishing a patency of the occluded anatomical canals or separation of the adherent cerebellum. A number of surgeons have already attempted to establish such communication by differing methods, and with varying results, as might be expected, for many of these little patients are brought to operation in varying degrees of development, some representing the graver types, in which all that can be hoped for at most is an amelioration of the severest symptoms. It will no doubt be true that, with the elaboration of a more perfect technic, the future will present a greater number of these cases coming to operation at that early period in the affliction when the cerebral mass is as yet not seriously damaged by prolonged pressure.

Sutherland and Cheyne, some ten years ago, advocated and employed catgut to establish capillary drainage between the ventricles and subarachnoid spaces. They passed a number of strands of catgut, tied together, into the ventricles, leaving the outer end in the subdural space. The result in the two cases reported was not the most satisfactory. Dr. Keen also employed this method in one case, and Dr. A. S. Taylor in two cases. The results here again were not entirely satisfactory, but both of Taylor's cases were living twenty and twelve months, respectively, after the operations, with mental symptoms improved.

Keen, in a later case, similarly employed horsehair,

but operating four days later on the opposite side, to introduce a rubber tube, the ventricular fluid escaped too rapidly, and the child died in convulsions.

Troje, in a similar manner, used the glass-wool drain of Mikulicz, the drain being replaced at the end of two years, and the child much improved.

Mikulicz employed a gold drainage-tube with a flange upon the end to prevent its slipping into the ventricles.

Dr. MacArthur has employed a similar tube with success, while Dr. J. S. Horsley made use of a silver tube, and Dr. Charles Balance, a tube made of gold with iridium or with platinum, this being bent at a right-angle at the termination in the subdural space.

Subcutaneous drainage into the tissues of the scalp was advocated by Feiss, and has been employed by Turck, Senn, and J. S. Horsley, with satisfactory results.

Dr. Balance has advocated and employed ligation of both common carotids with a view to limiting the blood-supply to the brain, and thereby checking the secretion of fluid in the ventricles. He says: "This may be safely done in children with hydrocephalus, in whom the blood-supply of the brain-stem is of much more relative importance than that to the cerebral substance and choroid plexus."

Of the other procedures which have been advocated for the relief of this condition, it may be said that they hardly hold out sufficient hope of benefit to entitle them to consideration. Among these may be mentioned trying to limit the distention of the ventricles, by extracranial tension, as may be secured by strapping the head, a procedure which, in most instances, must result in a degree of pressure in the cerebral mass that must be fatal to its integrity.

Tapping the ventricles rarely gives more than temporary relief, and of slight degree, while lumbar

punctures must necessarily fall short of relief when the subarachnoid space no longer communicates with the ventricles.

I herewith submit the clinical history and management of this condition in a child who recently came under our care.

Female, aged 12 months, who until the age of three months had been in all respects normal, when, following upon a slight illness the exact character of which was not apparent, there was noticed a gradual enlargement of the head, which continued until the time she came to operation on October 1, 1907, when she possessed the measurements already given.

I will not burden you with the unessentials of the case.

The left ventricle was entered about four inches above the external auditory meatus, by first raising a small horseshoe flap of the scalp, with a base of about two inches, the bone being exceedingly thin. A small piece was elevated after first cutting through it with a scalpel, and bending the bone flap back, exposing the dura, which was opened just sufficiently to admit the drain that was employed.

The drain consisted of four loops (eight strands) of fine silver wire (about No. 26), which was gently twisted to form a capillary drain, about three inches long. The end containing the loops was passed through the dural opening and underlying brain substance into the ventricle. This was slowly done in order to observe when the ventricle had been entered through noting the escape of fluid along the drain, it being probably undesirable to have the end of the drain project far into the ventricle in event of a subsequent diminution in the size of the cavity; so the drain was permitted to project into the same about one-half inch, and as the length of the drainage proper was only about one inch, the distal portion was cut

off so as to leave about three-fourths of an inch above the dura. Six of the strands comprising the drain were turned at right angles, and passed between the dura and bone into the subarachnoid space. The other two were placed in the lower angle of the osseous wound, extending out in the subaponeurotic space, it being presumed that these latter strands might aid in bringing about some degree of absorption from the subaponeurotic area for a time, and thus avert an external hydrocephalus.

The plate of bone was forced back into position, and the scalp wound closed. That the drain so inserted would afford ready exit to the fluid from the ventricle, for the present at least, was evident from the cerebral fluid escaping from the line of sutures, and that, too, after coaptating the edges of the wound as firmly as might be safely done.

The child rallied fairly well after the operation. Twenty-four hours later, the chart showed a temperature of 102° F.; pulse, 150; respiration, 36. There was a gradual improvement up to sixty hours after the operation, when a profuse escape of fluid took place through the line of suture. The child developed most pronounced symptoms as this and lesser successive drainage occurred. The temperature ranged from 104° to 107.5°; and the pulse went as high as 220 and was often imperceptible at the radial; the respiration rose to 80. There was marked muscular rigidity, showing tetanic symptoms at times. Another striking feature was the sudden changes in temperature, being sometimes two or three degrees in fifteen to twenty minutes time, and it responded little or none to cooling baths, or similar means of reducing temperature.

This continued for two weeks, when there was a gradual improvement, so that, at the end of three weeks, the child was quite comfortable, taking nourish-

ment well, and appearing much brighter mentally. The physical changes in the condition of the head were very apparent. The fontanelles, which were bulging and tense, were now marked depressions, and their greatest width at the widest separation, which was six inches previous to operation, decreased to four, and the frontal and parietal which overlapped the frontal circumference were reduced from 67 to 63 cm.

CONCLUSIONS

The management of this case was based upon the conception that relief could be afforded, if at all, only through the establishment of an artificial canal between the ventricles and subarachnoid space, to take the place of the normal ones, which were presumed to be closed. Furthermore, such canal, in order to be of more than temporary service, must serve continuously as a means of exit for the constantly forming ventricular fluid.

Our reasons for using a capillary, in place of a tubular, drain was the fear that by the latter method a too-rapid escape of ventricular fluid might result were a tube used of a caliber sufficient to ensure permanent patency. Silver wire was selected for the reason that it would undergo less change from prolonged presence in the tissues than would be the case with any other material which might have been employed, unless it were gold. Our reasons for carrying two strands of the wire through the osseous wound and fixing them in the subaponeurotic space were to afford a means of escape of the fluid into this space from the subarachnoid and thus avert external hydrocephalus.

It is too early to say that material benefits will be the ultimate result in this case, even though the child at this time (3 months after the operation) shows a satisfactory improvement, as it is only through the accumulated experience of the profession extending

over a long period of time that data can be secured which will be reliable as a guide in this class of cases.

DISCUSSION

DR. J. D. GRIFFITH (Kansas City): The remarkable and interesting paper just read by Dr. Jepson appeals to us as surgeons, because we know these cases fall into the hands of the internist sooner or later. With reference to treatment: I do not think that any form of treatment amounts to much, so far as the ultimate results are concerned. I tried drainage in one case with only temporary relief. The child soon died. I tried lumbar puncture in the last two cases and have demonstrated that there is not only complete closure of the subarachnoid space, either by way of the aqueductus Fallopius or up through the ventricles. In one case I saw the child's head was larger than the diameter of the head of a child at fourteen months of age. I gave the little patient chloroform, resorted to lumbar puncture, and as I saw the first drop of fluid, I stopped the anesthetic and found the fluid was coming. The first time I removed six or eight drams by lumbar puncture; the next time, about a month afterwards, I took out a little over an ounce and a half. I thought the child was dead, and I quit. I made these continuous lumbar punctures at intervals of from three to six weeks, six or eight times, observing that the child's head was not increasing in size. I dared to throw five drops of Lugol's solution of iodine into the spinal canal, but you can imagine that my hair stood on end the first time I did it. I removed an ounce and a half of this fluid first. After I had injected Lugol's solution into the spinal canal I thought sure my patient was going to die. The child was breathing, but was nearly dead. I told the mother and father of the dangers before I did it. The child finally got better, and at the end of another six weeks the parents were bold enough to let me try it again, and this time I threw in ten drops of Lugol's solution of iodine. This time the child did not come to for thirty or forty minutes, but finally it began to breathe again, but since that time they would not let me do anything more for fear the child would die. I thought so myself. To my great surprise, not long since that child walked into my office and its head had quit growing. It has diminished in size somewhat, and the child was able to talk. It is a year and a half since the operation was done.

This case illustrates in a very striking way that lumbar puncture does not always fail; but the child might have re-

covered without lumbar puncture. Of the two cases in which I resorted to lumbar puncture, in the last one the result was very gratifying.

DR. CHARLES H. MAYO (Rochester): The last speaker says that these cases of hydrocephalus appeal to the surgeon. I think the majority of them really belong more to the official executioner. There does not seem to be any tendency toward repair or restoration in these cases. I have operated on a number of them, and twice within the last year I tried the Ballance-Horsley operation of ligation of the common carotids. One of these patients was a baby, three months old. I ligated first one common carotid, when the head was twenty-four and a quarter inches in diameter; waited about two weeks before ligating the second carotid. In that time the head grew three-quarters of an inch in diameter, and in the next five months it grew to twenty-seven inches, when the patient died.

I had another case, seven months old, in which I ligated one common carotid, and in two weeks ligated the second. The head grew half an inch between the two operations, and in a few weeks the patient died, the head having grown one and a half inches after the ligation of both common carotids.

As to autodrainage operations in cases of hydrocephalus: Most of them are found to be failures at the end of about nine months, in which scar-tissue prevents drainage, if it is an absorbable drain, while, if it is of another kind,—a permanent drain,—auto-infection is likely to take place, just as if we take a rabbit's leg, breaking it and injecting the staphylococcus at a distant point, there will develop a particular type of osteomyelitis, so that in this region, where we have very permanent non-absorbable material in these children, in from nine months to a year, auto-infection necessitates their removal.

I recall the case of a young man, at Rochester, who had an enormous head. Up to the age of sixteen his head was a mass of bruises because he was so top-heavy that he bumped the sidewalk every now and then. I have seen various stages of hydrocephalus in adults, so that it cannot always be said that improvement or recovery will not take place unless a patient is operated on.

As to obstruction being the cause of the trouble: It is true the formation of fluid in the ventricle is an important causal factor, and the same condition takes place when we have internal hydrocephalus of the same type that occurs with spina bifida. If one takes off a spina bifida during the

progress of rapid growth, death is likely to take place. I have seen macrocephalus with spina bifida in which, after the fluid was removed, the head began to expand.

So far as opening the ventricles is concerned, it does not amount to much of itself.

ANESTHESIA FATALITIES IN IOWA

LAWRENCE W. LITTIG, A. M., M. D., M. R. C. S.

IOWA CITY, IOWA

Some months ago I mailed a circular letter to 3,500 physicians practicing in Iowa. These letters were sent to every one whose name appeared in the directory issued by the Iowa Medical Journal, regardless of school or society affiliation. Eight hundred replies were received, many of them containing information which led to reports of fatalities by men who did not reply to the first letter.

I have rejected reported chloroform fatalities occurring from two to four days after anesthesia, because I did not think it possible to secure anything like reliable data in this class of cases. I have also rejected ether fatalities occurring "at the close of a long and difficult abdominal operation." I have excluded cases in which I thought that the operation itself was of sufficient magnitude to cause death on the operating-table, or soon after. I have excluded obstetric fatalities in which placenta previa or severe hemorrhage complicated delivery. I have excluded cases in which pneumonia or other lung complications followed gall-bladder or other abdominal work. I have excluded all cases seen by Iowa men in other states, except one case, No. 73.

The replies were most varied. One man had given chloroform an "immense number of times in any old way" and never had any trouble of any kind. He believed chloroform to be entirely free from danger. Another formulated the following advice:

"1. Never give an anesthetic unless the stomach is empty.

"2. Always insist that every garment is unfastened at the waist and at the neck, and that the patient is in the recumbent position.

"3. Never use chloroform from a stock bottle, but from a freshly opened container. Make liniment of what is left."

This report is far from correct in many ways, but the ratio of fatalities is just as correct for 83,000 (estimated) chloroform, as it is for 79,000 (estimated) ether anesthesias.

Chloroform fatalities occur especially in minor work —a few whiffs, a drachm or two, a few seconds, or a few minutes, and without warning. This is the old story, but men are so prone to forget.

There have been chloroform "scares" without number, often sufficiently intense to induce the physician to change from chloroform to ether in all of his subsequent work.

Methods of resuscitation varied from direct manipulation of the heart through the open abdominal wound, to the "one sure way: to grasp the patient by the legs, stand on a chair or a footstool, and swing him like a pendulum", suggested by the rat experiment of years ago.

Some weeks ago I was hurriedly called to an adjoining physician's office by a frantic woman. I found a two-hundred-and-forty-pound, six-feet-two doctor swinging a little dot of a girl of six, to whom he had administered chloroform and from whose face he had removed a pea-sized tumor. Great beads of perspiration were rolling down his cheeks; his coat, vest, and collar were lying on the floor; and he gasped, "take her and swing her". I took the child, but informed him that I was too lazy to swing a patient with such

good color, and with heart and lungs acting nicely. That man had his lesson without a fatality.

Scares are too numerous to mention, or to classify.

The reasons given for preferring chloroform are varied: it is "easier for an amateur to give," "is less bulky," "is pleasanter for the patient," "it stimulates uterine contractions", etc.

The friends of chloroform are found among the men who do the more limited amount of work, while the men who conduct the larger clinics use ether.

Of the 63 chloroform fatalities, cases 1 to 9a, inclusive, (ten cases), are dental fatalities, and in cases 1 to 50 the condition of the patient can hardly be regarded as a factor in the result. In cases 50 to 62 the condition of the patient was more grave, but in no instance was there any reason for thinking that the anesthetic (chloroform) could not be well borne.

The confinement fatalities are reported for what they are worth. I have submitted the reports to Joseph B. De Lee, who does not care to express an opinion on them. Although he says, "Without doubt, chloroform is not so safe in obstetrics as we have been led to believe, and, from my own sad experience, I am using it less and less." I report them as sudden deaths in confinement.

Of the other fatalities reported, only four seemed free from suspicion, and in one of these the method of administration was very faulty. "One cupful of ether in a Clover inhaler" sounds strange to the friends of the drop-method. Because a patient dies after a long and difficult abdominal operation or of some lung complication three days after a gall-duct operation, does not prove anything against ether.

The fatality in which hyoscine, morphine, and cactine played a role (No. 74) is not entirely clear, yet those who administered the same believe that the H. M. C. combination was responsible for the death.

In detail, the fatalities are as follows:

CHLOROFORM FATALITIES

Case 1 (20).—Dental fatality, reported by X. Y. Woman, aged 35, in a dental office, extraction of teeth. Duration of the anesthesia, five minutes. Two drachms of chloroform had been used. There were no heart lesions; sudden death.

Case 2 (6).—Dental fatality, reported by A. D. B. Occurred in a dental office. The patient, a woman aged 40. Her general appearance suggested good health, the heart had been examined and pronounced in good condition. A few drachms only of chloroform had been administered when the condition of the patient became unsatisfactory. The reporting physician, with office just across the hall, was hastily summoned and found the patient dead.

Case 3 (72).—Dental fatality, reported by F. S. S. Occurred in a dentist's office. Very little chloroform had been given, and the patient came out of the anesthesia while there was still one molar to be extracted. A few more whiffs of chloroform were given. As the tooth was drawn the patient straightened out and died.

Case 4 (651).—Dental fatality, reported by L. S. A. Woman, 35 years of age. Occurred in a dentist's office. Duration of the anesthesia, about five minutes. Several teeth had been extracted when with the extraction of the right lateral incisor she seemed to collapse; the heart ceased to beat at once; efforts at resuscitation were unavailing, and death followed.

Case 5 (599).—Dental fatality. Reported by N. G. W. Female, aged 22, was given chloroform for the extraction of a tooth. Duration of the anesthesia, three minutes. The amount of chloroform administered was half ounce, one-half of which was wasted. The chloroform was administered by dropping the same on a small piece of absorbent cotton, which was held above the nose; the patient breathed easily and asked that the chloroform be given faster. In the words of the reporter: "I raised the cotton, applied a little more chloroform, and let her breathe again. She breathed steadily for full two minutes, but did not seem to accomplish anything, when she entered the second stage of anesthesia. She struggled a little, threw back one hand, her eyes dilated, she gasped and stopped breathing. I pressed on her chest and tried to reach her tongue to pull it out, but her jaws were set. I immediately lowered her head and injected 1-20 gr. of strychnine. I called another doctor, and her husband called another from a neighboring town. Her clothes were loosened; we kept up artificial

respiration for over two hours, but we could not re-establish respiration. During this time her heart stopped beating, and life was gone."

Case 6 (601).—Dental fatality, reported by G. E. G. A woman, aged 35 years, in good health, heart's action strong and regular. The physician giving chloroform announced "ready," but before the tooth could be extracted she straightened out, and efforts to revive her were unavailing.

Case 7 (418).—Dental fatality, a chloroform fatality in the office of E. A. G., a dentist. The A. C. E. mixture was followed by chloroform, and death resulted.

Case 8 (699).—Dental fatality, reported by J. A. B. A woman, middle-aged, in good health. About one drachm of chloroform had been given in a dental chair, when the pulse grew very weak, the chloroform was discontinued. She was removed from the chair and her head and shoulders lowered, the respiration continued for some minutes after the heart failed, but death followed.

Case 9 (705).—Reported by H. E. K. A fatality in a dental office.

Case 9a (707).—Dental fatality, reported by H. F. N. A woman, aged 36, had taken chloroform five days before for the extraction of teeth. On the fatal day she was given three drachms of chloroform. Three teeth had been extracted, and the operator was at work on the fourth when she was noticed to be doing badly. Efforts at resuscitation, continued for more than one hour, were unavailing.

Case 10 (9).—Reported by F. P. Male, aged 40 years, presented marked arteriosclerosis. The operation was for cancer of the lip. Patient died within a few moments after beginning the administration of chloroform.

Case 11 (4).—Reported by F. S. S. Lad of 8 years. A tonsillotomy had been performed, followed by circumcision. The doctor was assisted by a nurse, and on the completion of the circumcision the patient was dead.

Case 12 (17).—Reported by J. D. H. Boy of 10 years, who was being anesthetized for the amputation of a finger that had been crushed some eight days before. But a few whiffs of chloroform had been given when the lad ceased to breathe well, and all efforts at resuscitation failed.

Case 13 (23).—Reported by X. Y. A laborer, a robust man, was being anesthetized for small omental hernia. Heart was sound. Twenty drops of chloroform had been used when respiration suddenly ceased, the pupils dilated, the patient

jumped from the table, knocking over solutions and trays of instruments, ran about ten feet, and "fell stone dead."

Case 14 (24).—Reported by G. R. Large, fleshy woman, aged 39 years, was being anesthetized for curettement. A few ounces of chloroform had been used for twenty minutes, when respiration suddenly ceased, and efforts at resuscitation failed.

Case 15 (55.)—A lad, aged 12 years, was being chloroformed for amputation of the leg. Chloroform was being administered in small quantities. The operation had not been begun when the lad suddenly ceased breathing, and efforts at resuscitation were unavailing.

Case 16 (56).—Reported by A. O. W. A man, aged 24 years, who was being anesthetized for the removal of inguinal glands. Chloroform had been administered for about ten minutes. Two drachms of chloroform had been used. All efforts at resuscitation were unavailing.

Case 17 (61).—Reported by G. M. A lad of 12, to whom chloroform was being given for the purpose of making passive motion after an injury to the elbow-joint. After the joint had been limbered and the arm was being replaced in the splint, the pupils suddenly dilated ad maximum, the heart stopped, and death resulted in spite of all efforts at resuscitation.

Case 18 (703).—Reported by J. C. L. A middle-aged man; necrosis of the tibia. Chloroform anesthesia had just been begun, and the leg was being "scrubbed" when the patient stopped breathing and died immediately. "We spent two hours trying to resuscitate him."

Case 19 (61).—Reported by G. M. Male, aged 30 years, about to be operated upon for fistula in ano. Chloroform was taken very nicely, and the patient seemed to be sufficiently anesthetized for the operation to proceed. He was drawn to the foot of the table, and stopped breathing, but the pulse continued for some time after the cessation of respiration. All efforts at resuscitation were unavailing.

Case 20 (63).—Reported by J. E. B. A woman, aged 20 years, was being prepared for an abdominal section. One drachm of chloroform had been very cautiously given, respiration suddenly ceased, pupils dilated, efforts at resuscitation failed.

Case 21 (74).—Reported by A. S. G. A female child, aged 5 years, was being anesthetized for a mastoid abscess. But one drachm of chloroform had been used when death suddenly occurred.

Case 22 (334).—Reported by W. A. L. A child 5 years of age was being anesthetized for circumcision. Death promptly occurred.

Case 23 (412).—Reported by R. H. S. A lad, 10 years of age, was being anesthetized for the removal of tubercular glands of the neck. One drachm of chloroform had been used when death occurred.

Case 24 (424).—Reported by V. B. K. Female, age 36 years, was being anesthetized for post-operative dressing in atresia of the vagina. The administration of chloroform had been in progress less than three minutes when death occurred. She was dead before danger was suspected, and "remained dead."

Case 25 (438).—Reported by E. S. A man, age 30 years, The administration had been in progress for about ten minutes, the case being one of adhesions about the knee-joint. Heart failure and prompt death.

Case 26 (446).—Reported by E. C. A. Male, 18 years of age, who was being anesthetized for the amputation of the index finger. One-half ounce of chloroform had been used,

Case 27 (459).—Reported by R. N. C. Female, 35 years of age, about to be operated upon for hemorrhoids. Death occurred as the anus was being dilated.

Case 28 (460) .—Reported by I. H. S. A man, 70 years of age, was being anesthetized for the removal of a large tumor from the right scapula. Chloroform was taken from an unopened package. Narcosis was prompt, the patient was turned upon his side, and respiration ceased as the second incision was made. The heart continued to beat faintly for half a minute or more. There was no warning.

Case 29 (447).—Reported by J. J. M. Female, 30 years of age. She walked into the office, and an examination disclosed the fact that a putrid, ropy discharge was coming from the uterus, the result of an abortion of a three months' pregnancy. She was immediately chloroformed, the uterus curetted, and at the expiration of about eight minutes her condition was noticed to be bad. She gasped a few times and was dead.

Case 30 (489).—Reported by P. V. J. Woman, age 43 years, heart, lungs, and general health, good. Chloroform was administered for a trachelorrhaphy and curettement. Curettement was completed, when, without the slightest warning, the patient stopped breathing and was dead.

Case 31 (508).—Reported by H. A. L. A man, 35 years of age, alcoholic, who was being anesthetized for the purpose of

incising an infected hand. After a few inhalations, the patient was dead.

Case 32 (530).—Reported by J. W. C. A man, 60 years of age, was being chloroformed for amputation of the thigh. A few moments after the beginning of the administration he raised himself on one elbow, and the surgeon requested him to lie down. The request was unnecessary: he fell back dead.

Case 33 (537).—Reported by P. N. J. A man, age 50 years, had infected glands of the neck. Duration of the anesthesia, 10 minutes. Simple incision and drainage. Death.

Case 34 (595).—Reported by E. H. Female, age 28 years of age, suffering from a supra-orbital neuritis. One drachm of chloroform was used when the patient was in the sitting posture. Efforts at resuscitation were unavailing.

Case 35 (610).—Reported by H. E. C. A man, 38 to 40 years of age, was to be operated upon for a carcinoma of the lower lip. The administration of the anesthetic had just begun, when the patient died suddenly.

Case 36 (616).—Reported by D. M. A man, 70 years of age, who was being prepared for the incision of a large prostatic abscess. Chloroform had been given for three minutes, when, without a single warning sign, death occurred.

Case 37 (616).—Reported by D. M. Woman, 57 years of age, with advanced carcinoma of the cervix. Chloroform had been administered for five minutes, when the heart and lungs ceased to act. All efforts to revive the patient were unavailing.

Case 38 (649).—Reported by J. C. T. A man, 60 years of age, was being chloroformed for the removal of the prostate. The doctor states that he was going to use Ochsner's method, and was about to begin with ether when the patient died. Efforts to revive him were unavailing after one hour. The operation had not been performed. (No answer received to a request to explain Ochsner's method.)

Case 39 (631).—Reported by H. H. C. Man, 69 years of age. The reporter was never known to write a long letter.

Case 40 (650).—Reported by J. F. M. A boy, 14 years of age, was operated upon for suppuration of the cervical glands. A very small amount of chloroform was used. Time of operation, 30 seconds. The doctor left the patient for a moment to prepare dressings in another part of the room; when he returned to the table the patient was dead.

Case 41 (418).—Reported by E. B. A young man, whose arm was to be amputated for some injury. He appeared to be

in good condition, but stopped breathing before the amputation was begun.

Case 42 (499).—Reported by A. W. S. A lad of 6 years. About one drachm of chloroform was used. An incision was made along the posterior border of the mastoid muscle to remove tubercular glands. Patient immediately became cyanotic, but was easily restored; however, within a few moments he again became cyanotic and died.

Case 43 (683).—Also reported by A. L. W. A man, 40 years of age, alcoholic, was being chloroformed for an epithelioma of the lower lip and tubercular glands under the jaw. The first whiff of chloroform seemed to excite the patient, for the fellow at once "went into the air for a moment", then settled down. The reporter says: "I turned to the patient, and he was dead."

Case 44 (595).—Reported by H. & D. A man, 40 years of age, had hemorrhoids and a sharp piece of chicken bone in the lower part of the rectum. A few whiffs only of chloroform were followed by death.

Case 45 (92).—Reported by A. R. A woman, aged 45 years, was being chloroformed for a slight operation on the finger. She died in the office-chair without warning.

Case 46 (689).—Reported by J. W. L. A chloroform fatality in the office of A. A. H., in which chloroform was being administered to a woman with a sprained wrist. Reported by several, but A. A. H. is dead.

Case 47 (689).—Reported by J. W. L. A chloroform fatality in the office of A. A. H. (Data received since reading the paper). This case was one in which chloroform was used for the reduction and setting of a broken arm. The patient had false teeth which the doctor did not remove, and which slipped into the windpipe during the anesthesia, causing immediate death.

Case 48 (588).—Reported by L. S. A man, alcoholic, 26 years old. A few drops of chloroform, and death. Reporter is one of the best surgeons in the state. Further details impossible to obtain.

Case 49 (700).—Reported by F. K. Young woman, 20 years of age, to be operated on for suppurative appendicitis. She was placed upon the table. A few whiffs of chloroform, and death followed before operation was begun.

Case 50 (701).—Reported by N. C. M. A lad; died a few minutes after the beginning of the administration of the anesthetic. (Further details impossible to obtain, but reporter is personally known.)

Case 51 (27).—Reported by H. N. A girl, ten years of age, upon whom an operation for a left-sided empyema was about to be performed. Two drachms of chloroform had been carefully administered, and the surgeon was about to make the incision, when the patient stopped breathing, and the heart ceased beating in less than one minute, there being absolutely no warning.

Case 52 (373).—Reported by C. F. W. A rather feeble man, 46 years of age, who was being anesthetized for operation for a thoracic puncture. Chloroform had been given for only three minutes, when danger signs occurred. Death was prompt.

Case 53 (690).—Reported by J. G. M. A man, 48 years old, was about to be operated on for some throat difficulty, which interfered with free respiration. The patient walked to the operating-room, was placed upon the table, and ceased to breathe after two or three whiffs of chloroform. Not more than a drachm of chloroform had been used. There was not sufficient mechanical impediment to respiration to explain the fatal result.

Case 54 (191).—Reported by E. E. D. This patient had received an injury to the skull twenty-four hours before. Only a few drops of chloroform had been used; death was very sudden.

Case 55 (683).—Reported by A. L. W. This case is accepted as a chloroform fatality because it is so presented by the reporter, a gentleman whom we all know and one whose judgment we have the greatest confidence in.

Case 56 (19).—Reported by R. R. W. Girl, seven years of age, had had a horse-bean in her trachea for four days. She took a few whiffs of chloroform and was dead.

Case 57 (32).—Reported by R. N. P. Female child, about 19 months of age, was about to be operated on for a post-pharyngeal abscess. Only a few whiffs of chloroform had been given, and the patient died. "She was in very bad condition when the administration was begun."

Case 58 (70).—Reported by J. S. B. Female, 26 years of age. Operation for ectopic gestation with rupture of the tube. Death was sudden during the operation.

Case 59 (73).—Reported by J. W. C. Man, 60 years of age. Amputation of the thigh. Death three minutes after the administration was begun.

Case 60 (683).—Also reported A. L. W. Same reporter as of Case 56, and accepted for the same reason. A lad of 15 years. About to be operated on for intestinal obstruction.

Chloroform was administered by a dentist. Death occurred early in the operation.

Case 61 (73).—Reported by J. W. C. A lad of 11 years, to be operated on for exsection of the duodenum; dead in five minutes.

Case 62 (530).—Reported by J. W. C. Lad of 8 years. Obstruction of the bowels. The patient died a few minutes after the first incision.

Case 63 (390).—Reported by J. H. C. Fatality in confinement. Two ounces of chloroform had been used. The anesthesia had been in progress for about thirty minutes. Version had been performed, and a healthy child delivered, when the pulse became very feeble, and uterine hemorrhage was suspected, but the uterus was contracted, and death occurred in a short time. A post-mortem was made and there was no hemorrhage in the uterus.

Case 64 (614).—Reported by G. C. M. A fatality in confinement. Patient was 35 years of age, and in good health; third confinement. She had been in labor about twelve hours. How much chloroform had been administered is not stated by the reporter, who was called as consultant and found the patient under the influence of chloroform on his arrival. The child was delivered in a few moments. There was no hemorrhage. The patient suddenly ceased breathing, was pulseless, and dead.

Case 65 (614).—Reported by G. C. M. Confinement fatality. Age about 25; healthy; second confinement. She was delivered by the consultant within five minutes of his arrival. She was profoundly under the influence of chloroform. There had been but little hemorrhage, but she died a few moments after delivery.

Case 66 (26).—Reported by A. K. A fatality in obstetric practice. The patient was suffering from exophthalmic goitre. She gave birth to twins, both of whom were undersized. Only a small quantity of chloroform had been used. The labor progressed satisfactory until the birth of the second child, when the patient gulped, the face became livid, the eyes rolled back, the pulse ceased, and all was over. There was no hemorrhage.

Case 67 (419).—Reported by G. S. M. Patient, 36 years of age, had been in labor several hours, chloroform being administered "off and on". A craniotomy was undertaken, and delivery was almost completed, when the patient became pulseless, and died immediately. Hemorrhage was not a factor.

Case 68 (539).—Reported by De B. A lad, 10 years of age, was being chloroformed for a phimosis operation. He had been cautioned to eat a light dinner, but after a few whiffs of chloroform he was choked to death by a piece of beef-steak. (A beef-steak fatality).

ETHER FATALITIES

Case 69 (570).—Reported by J. W. H. An ether fatality. In this case the ether was being administered for the amputation of the leg. The patient was weak and anemic. Using the words of the reporter: "We undertook the administration of ether with considerable care, commencing with a cupful placed in a Clover's ether-inhaler, and after giving the same for about fifteen minutes we noticed that she was not doing well. We took the ether away and gave a hypodermic of nitrate of strychnia. We placed her in the Trendelenberg position, performing artificial respiration, etc. We worked hard for an hour and a half.

Case 70 (588).—Reported by L. S. An ether fatality.

Case 71 (702).—Reported by A. B. P. A man, middle-aged, with sarcoma of the rectum, took ether nicely for two minutes, and was dead at the expiration of the third minute.

Case 72 (634).—Reported by H. W. B. Male, 65 years of age; intestinal obstruction; under ether twenty minutes; respiration failed. Used artificial respiration and dilation of sphincters, and gave amyl nitrate, nitroglycerine, and strychnia. Death resulted. An Allis-inhaler was used.

Case 73 (57).—Reported by A. T. B. (A Dakota case). An ether fatality in obstetric practice. The patient had been under the influence of the ether for about one and one-half hours, and one and one-half pounds of ether had been used previous to the arrival of the reporter, and death occurred a few minutes later. The reporter states positively that there had not been sufficient hemorrhage to be considered a factor in producing the fatality.

Case 74 (692).—Reported by M. A. T. Sarcoma of the right arm. The patient was given one-fourth grain morphine, one-hundredth hyoscine hydrobromide, and 1-67 grain of cactine one hour before the administration of the chloroform. It was begun at 10:30 A. M., and continued for about ten minutes when ether was used, and ten minutes later breathing became shallow. At the end of twenty minutes more, the breathing was very shallow, about five per minute. A little bit later, respiration ceased, and the pulse was about 50 and of rather good quality. Artificial respiration continued for

one hour. Death. The reporter adds: "My experience with hyoscine, morphine, and cactine compound has been too limit- to form a correct estimate of its value. I no longer use them."

Case 75 (706).—Reported by J. C. O. Operation proposed for repair of lacerated cervix and perineum. Anesthesia began with chloroform. Changed to ether, and death followed about ten minutes later.

Case 76 (82).—Reported by F. H. S. Death five days after chloroform anesthesia; profound jaundice.

Case 77 (708).—(Report received after the St. Louis meeting). An office chloroform fatality, reported by J. S. N. A man, aged 50, alcoholic, was being chloroformed for the enucleation of an eye. Chloroform was administered on a gauze mask, and it required thirty minutes to induce surgical anesthesia. As the operation was begun it was noticed that the patient was not breathing well. "Artificial respiration, stretching the sphincter, injections of whiskey, and strychnia failed to start him again." Death.

Case 78 (711).—(Report received after the St. Louis meeting.) Reported by D. C. B. A woman, 60 years of age, gall-stone colic, taken during the early hours of the morning. A physician was immediately summoned, who, at intervals, administered three H. M. C. tablets hypodermically, before daylight. Three more tablets were left, which the patient took during the day, and at 7 o'clock in the evening the doctor gave her a quarter of a grain of morphine with atropine. Shortly afterward she had a sensation as if something had given away in her side, and she stated that she felt easier, and within five minutes stopped breathing and died.

(While not properly an anesthesia fatality, this case is instructive from several standpoints.)

To resume:

This report contains 63 chloroform fatalities. Of these 63 fatalities, 10 occurred in dental practice. One fatality is due to choking during anesthesia. There are five fatalities in confinement in which chloroform was used, and in which the reporters blame the chloroform. There is one confinement fatality (a Dakota case), in which ether was used, and in which the reporter blames the ether.

There is one H. M. C., ether and chloroform sequence, and one chloroform-ether sequence.

There is one late chloroform fatality, with jaundice.

CONCLUSIONS

All long and well known.

1. Chloroform is vastly more dangerous than ether, and especially so in minor work and at the beginning of administration. The chloroform-ether sequence is especially bad.

2. In the class of work mentioned, chloroform is so much more dangerous than ether that its use should be most emphatically condemned, and it should be known that "the surgeon (quoting H. C. Wood, writing 16 years ago, or earlier) is not justified in using chloroform, except under certain circumstances and for very definite reasons."

3. Chloroform is especially dangerous in dental work and should not be used.

4. Chloroform is not free from danger in obstetric practice.

In closing I wish to read a letter received from Dr. Oscar Burbank, of Waverly, Iowa, now 88 years old.

He says:

Dear Doctor:

It was my fortune to be a medical student in Boston, Mass., and to be present, in November, 1846, when the first operation under the influence of ether was done in the Massachusetts General Hospital, by Prof. John Collins Warren, Professor of Anatomy and Surgery at the time in the Harvard Medical College. The anesthetic was given by Dr. Morton, a dentist, who had had some personal experience in extracting teeth. The surgeons did not know the name of the anesthetic that day. I well remember how Dr. Warren came before us after the operation was completed and said: "Gentlemen, this is no humbug."

To these words of Dr. Warren we all say "Amen."

DISCUSSION

DR. D. C. BROCKMAN (Ottumwa, Iowa): This paper is one that has required a large amount of work in its preparation, and it is very important to the Association. It shows what many of us have been trying to teach for a number of years, namely, that chloroform is a dangerous anesthetic and that there is very little excuse for using it, except under special circumstances. There are circumstances, however, when probably chloroform should be used.

I was surprised to find that there have been so many fatalities in Iowa from chloroform, and yet I have no doubt there are many fatalities from it that have not been reported.

I would like to ask Dr. Littig how many cases of fatalities there have been from the use of ether?

DR. LITTIG: Four deaths from ether, with sixty-three from chloroform.

DR. BROCKMAN: From what has been said, you can get some idea of the relative dangers of the two anesthetics. I want to call attention to the point that there is one class of people to whom it is dangerous to give chloroform, namely, hard drinkers, especially men who are recovering from a debauch. I recognized two or three of the chloroform fatalities as having occurred in men who were just getting over a hard drunk. We should never, if possible, give a man who has been on a long spree any anesthetic, and surely not chloroform.

Another anesthetic which, I think, is more dangerous than has hitherto been considered, one which is used among the common people, because it is prescribed by the every-day country doctor more than any other, it is the combination of morphine and hyoscin. I want to say this, that from one-half to two-thirds of the doctors in the country are carrying around with them tablets of the hyoscin and morphine compound which they use when morphine is needed.

The hyoscin is a dangerous thing to be employed, and should be used only with the utmost care. Yet the less the average doctor knows about the action of hyoscin the more frequently he uses it. One-half of the country doctors carry these tablets, and doubtless use them without any discretion whatever. They use them in almost all confinement cases, and in many instances it is almost impossible to resuscitate the child. The child is born asphyxiated, and the practitioner has lots of trouble in resuscitating it.

I wish to report, briefly, a case of gall-stone colic. A doctor was in our town during the day and said to me that the

night before he had a case of gall-stone colic to which he gave three of these tablets, that is, 1-100 gr. hyoscin, 1-4 gr. morphine, and a certain amount of cactin, hypodermically. On leaving, at seven o'clock in the morning, he left three more tablets to be given, if necessary. I saw him a day or two afterwards, and he said to me: "You remember the case of gall-stone colic. I found she had taken these three tablets. At 7 o'clock at night I gave her 1-4 gr. morphine with atropine, as the pain was severe. I gave her another 1-8 gr. morphine in an hour, when she said that something gave way in her side, and inside of five minutes she ceased breathing and died."

I simply mention this and urge that the members of this and other associations use their influence against the indiscriminate use by country doctors of these dangerous combinations.

Dr. Henry T. Byford (Chicago): I want to emphasize one point, namely, that chloroform should not be as dangerous as ether. Those who have seen these fatalities will, I think, agree with me that the main difference between the two is that chloroform kills quickly. It is more powerful and must be given with greater caution than ether, particularly at the beginning of the anesthesia; but a competent anesthetizer should be able to almost entirely avoid this danger. A competent anesthetizer, however, cannot alter the fact that ether must be given in such quantities that in long operations the larger amount makes it more irritating to the tissues. Towards the end of a long operation an inexperienced anesthetizer is in just as much danger of killing his patient slowly as he is in danger of killing him quickly. Similarly, alcohol, which is a less powerful anesthetic than either, might be more dangerous as an anesthetic on account of its irritating qualities; hence the stronger the anesthetic the safer, up to a certain point, in competent hands. We want the greatest anesthetic action with the smallest amount of the irritating poison.

Dc. Charles S. James (Centerville, Iowa): There is one important factor in connection wtih the question of anesthesia other than the variation between the results of ether or chloroform anesthesia, and that is the personal factor of the administrator. I think we all recognize that the difference in safety between chloroform anesthesia and ether anesthesia lies in the wider range of safety between the anesthetic and the lethal dose. But that is not a matter for discussion. The same remark that was made by my colleague, Dr. Brockman,

regarding the education of the average practitioner in the administration of poisonous agents, be it hyoscin or morphine, applies equally well in the administration of anesthetics. I believe it is the experience of nearly every man that a considerable percentage of the anesthetics he has observed given, unless the anesthetic is given by an experienced anesthetizer in a well-regulated hospital, are given by men who are not very skilful in this work. Take chloroform. Personally, I do not use it, but while we are attacking chloroform, I think the personal equation in the administration of either anesthetic should be borne in mind in this discussion.

DR. B. B. DAVIS (Omaha): There is one element in connection with death from chloroform that appeals to me, and that is, in a large number of the fatal cases the anesthetic is administered for a rather trivial condition. A very large proportion of patients walk into a doctor's office or to the hospital where they are to have the anesthetic given to them after having indulged in rather active exercise just before their admission. The only fatality I have ever had was one from chloroform in a boy, some 13 years of age. He was brought in in a hurry; his heart was beating more rapidly than it should, and he was not in a good condition for us to begin anesthesia.

I am under the impression that many of these deaths might have been avoided by allowing the patients to rest for a few minutes before beginning the administration of the anesthetic.

That is one important element in the administration of chloroform to be borne in mind, and it is usually chloroform that is administered in this particular class of cases rather than ether. A great many practitioners give chloroform for a short operation, a trivial affair, and they have not made any special preliminary preparation for the operation.

So far as my personal experience is concerned, I have used ether exclusively for years. I have known a number of men, in order to get around some of the disagreeable features of the ether, to begin with chloroform, and as soon as the patient is well under way they go on with the administration of ether. It seems to me, when they do that they are practically inviting the combined dangers of chloroform and ether, because most deaths from chloroform occur early in the administration of that anesthetic, while most of the deaths from ether occur late in the administration of that anesthetic, and it is inviting a double risk when the anesthetic is given in that way.

DR. CHARLES H. MAYO (Rochester): The point has been brought out that chloroform produces less sickness after its administration than ether. I believe that is true, but when we do get a case of chloroform sickness, I think it is fully as bad, and causes as much annoyance, as ten cases to which ether has been given. It lasts several days, and it is almost impossible to relieve it. Sickness from ether can usually be stopped by washing out the stomach.

After all, in this country, where we devote so little attention in our medical colleges to educating anesthetists, we have to bring it back to the way we would have it done to ourselves. For example, we operate on a good many physicians or surgeons in the course of a year, nearly all of whom think they have more or less heart disease. They know it. They do not fear the operation, but they do fear the anesthetic. Yet it is the habit in many places to send such patients, who have confidence in you and come to you on account of that confidence, to another room to be anesthetized, either by an interne of the hospital or by one who is not skilled in the administration of an anesthetic; and there may be two or three big assistants or roustabouts to hold the patients down in their struggles. Is it any wonder, then, that we have deaths or asphyxiations from the overuse of chloroform or ether? Many of us would not tolerate the manner in which anesthetics are given to some patients, and particularly with regard to the new methods of anesthesia that are coming into vogue, such as scopolamin-morphine injections into the spinal canal, spinal anesthesia, etc.

Let us consider the cases of evident heart disease. They seldom die from the anesthetic. We never look for or expect a death from heart disease where anesthetics have been administered. The men who stand by with digitalis, strychnine, brandy, ammonia, etc., ready to give hypodermics of these agents and to do other things, are the ones who expect unfortunate results on the table, while the fact of the matter is they do not give anesthetics as they ought to be given. The time has come when some method should be adopted in our medical colleges for teaching the administration of anesthetics as a special business. The amount of surgery that is being done in this country in every town of ordinary size demands this. Every such town should have a skilled anesthetist.

DR. W. W. GRANT (Denver): I would like to emphasize and heartily endorse the remarks made by Dr. Mayo as to teaching by our medical colleges with reference to the administration of anesthetics. If there is any one defect in the

college curriculum to-day, it is the fact that the graduates, no matter how long they have served in colleges, when they leave they are absolutely ignorant as to the method of giving anesthetics, and as to how they should be given, no matter how many operations they may have witnessed.

Nothing has been said as to the character of the cases which are safer with chloroform than with ether. I think it is generally understood that patients who have diseases of the bronchial tubes or air-passages are not good subjects for ether; also that those with arteriosclerosis and old alcoholic subjects are not good subjects for ether. But if I can select the anesthetizer and know he is skilled, I do not fear the administration of chloroform. I have always felt that there is more in the one who is giving the anesthetic than we are willing to grant. If the anesthetizer knows how to give an anesthetic properly, he knows how to discriminate and whether to give ether or chloroform, as the case may demand; yet, on the general principle that chloroform is more dangerous than ether, it is a safe rule to give ether in preference. The result is that internes, who are poorly qualified for the work, give it in most of the hospitals of the country. I believe there should be in every city, no matter how small, some one specially qualified for this work, for it is impossible for a surgeon to give the proper attention to the anesthetic and to his own special work.

It is customary to have the anesthetic given in a separate room. Although quiet is necessary, I give it in the operating-room, on the operating-table, so that the surgeon can give its administration some supervision, and shorten the time of the anesthesia. This is the rule I have more recently adopted, and unless there is serious objection on the part of the patient, I believe it is a good one to adopt generally in the administration of anesthetics.

Dr. J. R. Minahan (Green Bay): I believe that any patient can be killed with two drams of an agent like chloroform or with an equal amount of ether; and therefore the person who is giving the anesthetic should bear in mind that it is not the quantity of the anesthetic that is fatal, but it is the rapidity with which the patient takes the anesthetic that causes a fatal issue. If we have the patient in the operating-room where the surgeon is preparing himself and the unexpected happens, his attention will be called practically to the patient when he is almost dead or is dead. But, as I have previously remarked, I believe the trouble comes largely, if not entirely, from the rapidity with which the anesthetic is

given and the rapidity with which the patient takes it, and not from the quantitiy that is given.

Dr. James E. Moore (Minneapolis): As I am fearfully in the minority in this matter, I hesitate to address you. I feel I have a right to do so, inasmuch as for the last twenty years I have devoted myself exclusively to surgery, and during that time fully ninety-five per cent of my patients have had chloroform as an anesthetic, and none of them have died from it. After all, this matter of the anesthetic is one of prejudice. Our prejudice is founded upon our incompetence. If we must utilize the services of incompetent anesthetizers, then I grant you that ether is the safer anesthetic, because, as the last speaker has mentioned, it takes more of it, and a longer time, to kill the patient, but it will kill the patient just as certainly as chloroform. Another point to demonstrate that it is largely a matter of prejudice: If you go to England you will rarely see a patient take ether; if you go to Germany you will rarely see a patient take ether. Why? Because they know how to give chloroform. That is the principal point I wish to make. I agree with Dr. Mayo, that the time has come when we should insist on having skilled anesthetizers, considering the great amount of surgery that is being done all over this country. If I have a patient who is so impecunious that he cannot pay my skilled anesthetizer, I will still let my anesthetizer give the anesthetic to that patient and pay the fee myself.

I have a skilled anesthetizer, one who has served me for many years and who gives chloroform without hesitation to almost any kind of case. In fact, she likes to give it to patients with heart disease, because she knows she can bring them through safely. It seems to me that the time has arrived when we must insist on having this kind of anesthetizer all the time.

In Minnesota we allow our medical students to witness the administration of anesthetics to patients. I appoint certain members from my clinic each day who go into a private room where my skilled anesthetist is administering anesthetics, and she explains to them how she does it, and why she does it.

When I look back over my own experience, I have wondered many times why I did not have a lot of deaths, because I began using chloroform, not as I was taught originally by Prof. Sayre, but as ether is usually given. I poured it on until the patient went to sleep, and it was my good fortune that those patients did not die. In 1885 I went abroad, and stopped at Berlin and found them there using Esmarch's in-

haler. I brought some of these inhalers home, and also brought home with me from abroad an anesthetizer skilled in the use of chloroform by the drop-method, which I introduced into the city of Minneapolis and the Northwest. I kept that man with me, and loaned him to my friends who desired anesthetics to be given, and the consequence was, and is, that there are very few members of the medical profession in Minneapolis who are afraid of chloroform. Most of them use ether, but they use chloroform sometimes. I remember distinct instances of members of the profession who had a holy horror of giving anesthetics before I brought back from the old country the Esmarch inhalers. When these men bring patients to me and leave the matter of administering the anesthetic to me, I in turn leave it to my skilled anesthetizer, and she almost invariably gives the patients chloroform.

With reference to nausea: A certain percentage of patients are going to have nausea after an anesthetic, but scarcely so many of them have it after chloroform, yet some of them do. The experience of Dr. Mayo differs from mine in that regard. I have no patients who are sick three days after the administration of the anesthetic—none of them. I have the courage of my conviction, and will say to you that I took an anesthetic three years ago myself. I took chloroform. I knew my anesthetizer, and so I had no fear. I believe, gentlemen, the danger lies in the anesthetizer, and not in the anesthetic.

Dr. Jabez N. Jackson (Kansas City): While this discussion has developed into a sort of experience-meeting, yet the subject is one of intense interest to us all.

I must take issue with the last speaker in the statement that our conceptions are largely the result of prejudice. I do not believe that to be quite correct. Until a few years ago I entertained a very strong prejudice in favor of the administration of chloroform as an anesthetic and used it practically exclusively. I did so largely on account of the fact that up to that time I had never seen ether administered properly or in a way that could command my confidence. During the time in my city when chloroform was administered very largely as an anesthetic, it was almost a daily or weekly occurrence in some hospital, even though it did not result in a fatality, to have an occasion for a great scare, thinking that somebody was going to die; and the operator would have to suspend operation, resort to artificial respiration, and call upon some friend to help out in resuscitation while he could finish the operative work.

Four years ago, during a trip East, we particularly observed the administration of ether. I left New York with a more profound impression than I had ever had that it was not the anesthetic to use. I saw it given by the Clover inhaler, also by the Bennett apparatus, and felt that it could not be administered with anything like the same facility as chloroform. When I reached Philadelphia I saw ether administered in Dr. Deaver's clinic by the Esmarch inhaler, by the open drop-method. Later on, I visited the Mayos and saw the administration of ether there in the same way, namely, by the open drop-method. Having had an opportunity to observe a considerable number of cases, I was surprised to see that ether could be given with such facility and with so little trouble afterwards. Since that time I have used ether practically exclusively, and I imagine that ether is to-day almost exclusively used by all of our surgeons in Kansas City. I have not seen a case of death from an anesthetic in three years, nor has there been the slightest occasion, either in my own work or in that of others, to suspend an operation for a single minute, in order to resort to artificial respiration.

I will agree with anyone who says that success in the administration of anesthetics depends in a large measure upon the skilled anesthetist. This is eminently true. I do not think I would ever consent to the administration of an anesthetic like chloroform by an inexperienced interne. Yet in the days when I made use of chloroform, I had the most expert chloroform anesthetists I could secure, among them Bennett, now of New York, a man who has since earned a national reputation as an anesthetist. Notwithstanding the fact that I had the most skilled anesthetist, complications and dangers would arise, so that it is not altogether dependent on a skilled anesthetist. The best man will have accidents with the administration of chloroform.

If I went into country practice and had to pick up the average man, I believe I would recommend the administration of chloroform, because I believe the inexperienced practitioner has learned more about the administration of chloroform than he has of ether. But give me a skillful man in the administration of ether or chloroform, and I would say that there is absolutely no room for controversy. Ether is so vastly superior in the hands of the skilled anesthetist that there is no comparison. Furthermore, under the old methods of administering ether to the point of saturation, the patient got profound nausea. When ether is given in minimal quantities, in my experience and observation, nausea has ceased

to be a matter of any consequence. The vast majority of patients never vomit. If they do, it is usually once, and if a patient vomits I give him a large glassful of water, and repeat it until I clear out the stomach by autolavage, and if there is any nausea it ceases instantly.

I want to mention another point: The statement has been made here that the difference between ether and chloroform is that the latter kills rapidly and that the deaths from ether which occur later practically place its mortality with that of chloroform. I do not believe there are more after-mishaps and subsequent deaths from ether than from chloroform. As a matter of fact, since the introduction of ether we have not only not had any deaths from anesthesia directly, but I am satisfied the surgical mortality has been vastly reduced, because there have been fewer complications which prove fatal.

I have seen patients after simple operations—clean cases—develop post-operative paresis and die, and for a long time I did not know what that meant. But it was pointed out that such complications are due to the metabolic changes that take place in the economy as a result of the anesthetic, and these changes do not occur until some time after the operation.

I wish to call your attention to an article on the subject of acetonuria which appeared in the Boston Medical and Surgical Journal a few months ago. Acetonuria is one of the evidences of metabolic changes, due to some unknown chemical change in the body, which produces a certain number of deaths, and in these cases the presence of acetone can be demonstrated. Experiments were carried out in the Boston City Hospital, and the presence of acetone was demonstrated in the urine in a much larger proportion of cases in which chloroform had been administered than under ether with either the open or the closed method. While, however, there was considerable acetonuria by the closed ether methods, there was practically none by the open method; therefore, when we consider the dangers and disadvantages of these two anesthetics, I think the advantages are greatly in favor of ether when properly administered by the open method.

In the last two years I have used spinal anesthesia now and then in my surgical clinics, and while I would not let anybody stick a needle into my back and induce anesthesia in this way, yet I have never seen a fatality from this method of anesthesia.

Again, I repeat, ether given by the open method by a skill-

ed anesthetist is the ideal anesthetic, not only from the standpoint of a minimal mortality, but in minimal disturbance subsequent to the administration of the anesthetic.

Dr. Frederick A. Dunsmoor (Minneapolis): There is an expression which reads to this effect: "There are three kinds of lies—lies, damn lies, and statistics," and the greatest of these is statistics. In spite of all that, we must take the combined experience of practitioners the world over. If we take the experience of the expert anesthetist and that of the novice combined, I think it can be shown, beyond a question of a doubt, that chloroform in proportion to the time it is given kills more people at the time or later than ether; in fact, more than all the anesthetics combined, whether it be ether, cocaine, or scopolamine. I wish to confess that I had the strongest leaning toward choloroform anesthesia for the same reason that appeals to us, namely, it is more pleasant, quicker, and produces less vomiting. It can be easily carried, and people are prone to be careful about it. The things we are afraid of we handle with the greatest amount of care. I will also confess that I have taken chloroform as an anesthetic, but I tell you no man can give me chloroform again; I do not care who he is that is to give it. I prefer to take ether whenever I have to submit to a surgical operation.

Minnesota trains its medical students to give anesthetics as well as she knows how. She divides up the clinics so that twelve hospitals are giving clinics at the same time, and a certain number of students are assigned to watch the anesthetizer.

As to the amount of chloroform used and whether it kills quickly or not, we must believe some of the statistics. The majority of patients who are killed by chloroform are killed by small amounts, and, as one gentleman has said, the people who are killed are those who come to the offices of doctors for trivial operations, such as the removal of the tonsils, etc. I do not mean to say that there are not people who die when they are in the best of hands, because we know that to be true. But we must admit that people have idiosyncrasies. There are people who have died on the operating-table without any anesthetic having been administered. There are those who have died from goitre operations when they had cocaine used. There are others who have been frightened to death or have died from the performance of paracentesis, because of the shock incidental to the apprehension about it. If we take into consideration all these things and the volume of statistics with our combined experiences, we must admit that

ether is a safer anesthetic than chloroform, and we know it to be so in surgical practice to-day. But let it be given in the right way. Let us discourage the use of chloroform.

My friend, Dr. Davis, thinks we do not use logic when we start a patient with chloroform and subsequently change to ether. I will admit that whatever danger there is from a small amount of chloroform cannot be escaped. But if we use it at the beginning of anesthesia we get the least amount of danger. If we can put certain rebellious patients to sleep with a few drops of chloroform, that is the time to use it. If we prolong the operation, that is the time to return to the use of ether, because it is the safer drug.

Dr. M. L. Harris (Chicago): This subject has been very freely discussed, and as we have an abundance of time this afternoon we can devote a good deal of attention to it.

I concur absolutely in the conclusions reached by the author of this paper. I think no more forceful arraignment of the subject could be presented than he has given to-day—60 odd deaths from chloroform and 4 deaths from ether. The author has given practically all the cases of death that have occurred in the state of Iowa, which means that these deaths occur in the hands of surgeons throughout the country. It is true that every patient cannot be taken to a hospital to secure an expert anesthetist, therefore we must consider the average physician throughout the country as the anesthetist.

It is a curious thing if so much depends upon the anesthetist that every paper that has been writen since we knew anything about anesthetics should show an enormous preponderence of deaths from chloroform over ether; even in hospitals where professional persons give the anesthetic, we still find a very large preponderence of deaths under chloroform.

Dr. Moore says we are prejudiced. What has made us prejudiced? Not our imaginations. We have been prejudiced by the facts. In my own experience I have had three deaths from chloroform. The deaths occurred before the patients were touched in a surgical way. These deaths occurred in the hands of a professional anesthetist, who did nothing but give anesthetics, and had done nothing except that for several years. The anesthetic was given with the Esmarch apparatus. The anesthetic had just been started. In two of the cases it was the intention, as soon as the patient was asleep with chloroform, to change to ether. All three of the deaths occurred suddenly, long before I began to touch the patients.

Dr. Moore spoke about the Germans using chloroform and

not having deaths. The collective investigation of the German Surgical Society, undertaken a few years ago and continued year after year, regarding the anesthetics given in German hospitals, and taking into consideration every factor, shows unmistakably the same preponderance of deaths from the use of chloroform over ether as every other table that has been compiled.

We supposed at one time that ether irritated the kidneys and was dangerous in kidney complications, while chloroform was not. The facts show that where the urine has been examined after chloroform administration, a large percentage of the cases show albuminuria, as large a percentage as after the administration of ether. Therefore, instead of saying that the danger lies only in the anesthetist, the facts are, other things being equal, that the danger is in the anesthetic and not in the anesthetist.

DR. LITTIG (closing the discussion): I realize that this report was necessarily imperfect, and many of the details in regard to these cases were lacking. It was not my idea to bring forward the method of administering ether or chloroform, but to sound a note of alarm, which would reach to those corners of the state of Iowa, the highways and byways, where it was most needed. It is in such places that the majority of deaths have occurred.

With reference to the remarks made by Dr. Mayo, I would accept them in toto, as well as those made by Dr. Moore. Many of us have had the pleasure and privilege of seeing that peerless anesthetist, Alice Magaw, and also Miss Henderson, who anesthetizes for Dr. Charles Mayo, "talk their patients to sleep," and we have been charmed and instructed by the manner in which these ladies do their work. The lessons they have taught, and are teaching, practitioners have been carried far and wide, and practiced by the men throughout Iowa and many other states. The lessons these ladies have taught in regard to the administration of anesthetics have done an immense amount of good.

I will concede, for the sake of argument, that Dr. Moore is entirely correct when he says it is not the anesthetic, but the anesthetist, who lessens or adds to the danger. Most of the men in Iowa who give anesthetics are not experts at this work. They are doing work at the crossroads, and the majority of these deaths, except three or four, occurred in the practice of doctors in small towns. These are the men who ought to be reached; these are the men who ought to be taught that chloroform is especially dangerous in their work. There

were three circumcisions in children, with three deaths, a remarkable thing, which would hardly be possible with ether.

I would emphasize the fact that we are not trying to reach the skilled anesthetist, but are trying to reach men who are giving anesthetics all through the state of Iowa and other states.

As to the reasons given for the preference of chloroform: one man said it is "safer for the amateur to give;" but this is no reason for giving it. One man said that he preferred to give chloroform because it "stimulates uterine contractions." Another said that he gave it "in any old way because it was free from danger." These are the men we want to reach, rather than the members of this Association.

THE ABDOMINAL INCISION

CLIFFORD U. COLLINS, M. D.

PEORIA, ILLINOIS

Three muscles on each side of the abdominal wall pull on an aponeurosis in the central portion which meets the aponeurosis of the other side at a line running through the center from top to bottom, the linea alba.

The external oblique pulls obliquely upward from above; the internal oblique pulls obliquely downwards in the upper abdomen, and transversely in the central and lower abdomen; and the transversalis pulls transversely, as its name indicates. The combined pull of these muscles is from the linea alba. Dr. W. J. Mayo's transverse closure of an umbilical hernia is in accordance with this fact, and its success proves the truth of the principle involved.

One muscle on each side of the linea alba pulls straight up and down parallel with it. The recti muscles are firmly enclosed in a sheath formed by the aponeuroses of the three side muscles, except in the lower fourth, where the posterior layer of the sheath is practically absent. The recti muscles are not adherent at any point to the posterior layer of the sheath. They are closely adherent to the anterior layer of the sheath at points called the linea transversæ. There are usually three of these transverse lines, one opposite the umbilicus, one between the umbilicus and the ensiform cartilage, and one at the

level of the ensiform cartilage. As these lines correspond to certain ribs there may be, occasionally, more of them.

There are only four blood-vessels of any consequence in the abdominal wall, the two superior epigastric and the two deep epigastric. These vessels run between, and parallel with, the fibers of the recti muscles.

The lower six intercostal nerves on each side run in the general direction of the corresponding rib between the internal oblique and transversalis muscles until they reach the outer edge of the rectus, the linea semilunaris, which they cross at practically a right angle and penetrate the sheath. The location of these nerves was accurately pointed out by Blair (Surgery Gynecology & Obstetrics, August, 1905), and they should be kept in mind and not be cut.

Madelung, in 1905, wrote on the "Post-Operative Prolapse of the Abdominal Viscera" (Verhandl. d. deutsch. Gesellsch. f. Chir., Berl., 1905, XXXIV, 2. Teil, 168-222). He had collected 144 cases from the literature, six from personal communication, and added seven from his own practice. From these cases it was shown that the abdominal incision had burst open at almost any time up to and including seventeen days after laparotomy. This has happened to both sexes, to patients of every age, and after all sorts of abdominal conditions, and even after exploratory incisions where nothing was found. It is reported as far back as 1844 and occurs at the present time with all our boasted excellence of technic.

Low incisions have been most productive of this kind of trouble, and median, rather than lateral, incisions have conduced to it. The critical time is shown by his statistics to be the eighth or ninth day. Absorbable sutures have not been responsible, because it

has occurred after the use of every kind of suture material and after every form of closure. Coughing seems to be the particular factor which immediately brought it about. A generally depleted patient is, of course, more apt to have this sort of trouble, although it has happened when there was no visible evidence of interference with healing.

I have four cases to report of separation of the incision a few days after the operation.

CASE 1.—The patient had fibroids of the uterus with hemorrhage. She had flowed profusely for three weeks prior to the operation and had the pale, lemon-yellow color of anemia. She was also very fleshy. A hysterectomy was done and the incision closed in layers with continuous sutures of catgut. On the seventh day the nurse reported that the incision had separated. There seemed to have been no attempt toward healing, on account of the bloodless condition of the tissues. The omentum had been drawn down over the intestines beneath the incision just before the abdomen was closed. This was fortunate, as the omentum kept the intestines from protruding out of the incision. The patient was taken to the operating-room and anesthetized with ether, and the abdomen closed again with interrupted silkworm sutures passed through all the layers. The aponeurotic layer was sutured edge to edge with interrupted sutures of catgut. A drain was placed at the lower angle of the incision. Her further convalescence was uneventful.

CASE 2.—The patient had a large fibroid of the uterus with hemorrhages, the last hemorrhage being very severe and occurring just two weeks before the operation, therefore, she was very anemic. A hysterectomy was done, and each layer of the incision was closed with continuous catgut sutures reinforced by four interrupted figure-8 silkworm-gut sutures. She

developed a cough after the operation, and the incision separated the entire length in spite of the silkworm-gut sutures. The tissues around the incision lacked vitality on account of the anemia, and the sutures pulled right through them. On account of the bronchitis, which caused the cough, I did not want to administer ether again, so the bowels were kept in with a packing of gauze, and the edges of the incision were drawn together with adhesive plaster. It healed slowly, and she now has a large ventral hernia.

CASE 3.—This patient had a large cyst adenoma of the right ovary and multiple fibroids of the uterus. The ovary and uterus were removed. She was very fleshy. The incision was closed with continuous sutures of catgut for each layer. On the seventh day she made sudden movement in bed and felt something give. Examination showed that the incision had separated. The intestines were held in by the omentum, which had been drawn down over them before the abdomen was closed. She was taken to the operating-room and ether administered. The incision was closed with interrupted figure-8 sutures of silkworm-gut, the lower loop of the eight taking in aponeurosis, muscle, and peritoneum. A cigarette-drain was placed in the lower angle of the incision. The healing process then went on without interruption.

CASE 4.—This patient had a carcinoma of the stomach, and was emaciated and poorly nourished. The incision showed that the glands were involved, and the growth could not be removed successfully, so a gastro-enterostomy was quickly done with a Murphy button. Each layer of the incision was closed with a continuous suture of catgut, reinforced with interrupted figure-8 silkworm-gut sutures. In a few days he developed a cough. On the thirteenth day the silkworm-gut sutures were removed. On the fifteenth day the

nurse reported that the incision had separated. The edges of the incision were friable, and there had been little or no attempt at repair. I was away on a vacation, so one of my assistants took him to the operating-room where the incision was closed. He died ten days later as a result of the carcinoma.

All of these incisions were longitudinal and continuous through the recti muscles.

According to Madelung's findings, "those who believe that the use of a certain material or of a certain form of suture will successfully prevent the occurrence of post-operative hernia are in error." Then, it seems to me, the prevention must lie in better methods of making the incision.

In making the abdominal incision, two things are to be considered: First, the incision should be so placed as to give easy access to the pathological lesions present; second, it should permit of firm closure under conditions that will prevent a hernia.

Incisions should be placed so as to avoid cutting any of the intercostal nerves. It is a great deal more essential to avoid cutting the intercostal nerves than the blood-vessels. The only two blood-vessels of consequence are the deep epigastric and the superior epigastric arteries. The anastomosis of each is so plentiful that the tying of either vessel does not matter much, although it should be avoided when possible; but the cutting of an intercostal nerve may cause atrophy of the muscular structures it supplies and thus cause a weakening of the abdominal wall.

The incision should be made through both aponeurosis and muscle for two reasons: First, the muscle lends additional strength to the abdominal wall at the site of the incision, and, second, the muscle may be split and not cut, and in this way important structures, such as nerves and blood-vessels, which lie in the plane of the muscles, will not be injured. An in-

cision in the semilunar line, for instance, which is composed entirely of aponeurosis with no muscle beneath it, must be cut all the way through, and therefore the intercostal nerves crossing it in the line of the incision must be cut.

An incision should not be continuous through all the planes of the abdominal wall at the same points. If a longitudinal incision is made in the median line, it is better to complete the incision through a rectus muscle on one side instead of going on directly through in the linea alba. It is better, still, if the incisions through the aponeurotic and muscular planes can be made in different directions, as in the McBurney incision.

The incision should be closed in all cases where possible. If drainage is necessary it should be done through a small stab-wound, in which the muscular and aponeurotic structures are split, and not cut, to one side of the incision, and not through the incision. In making an incision for the simple drainage of an abscess the muscular and aponeurotic structures should be split, and not cut.

The best incision for the pelvis is Pfannenstiel's. The incision is made transversely through skin, fat, and aponeurosis of the external oblique and external sheath of the recti muscles about one inch above the pubes. The internal oblique is split transversely in the direction of its fibres. Then the recti muscles are separated in the median line, or either one is split longitudinally. No blood-vessels or nerves of any importance are encountered. The openings in the aponeurotic and muscular structures run in different directions, almost at right angles with each other, and thus practically insure the prevention of a ventral hernia. It has all the advantages of a McBurney incision for the pelvis. It permits of a very strong closure, the en-

tire aponeurotic opening being underlaid with solid muscle except at one small point where the openings cross, and the opening in the muscle layer being overlaid with a solid heavy aponeurosis except at the same small point. The action of the recti muscles tends to pull the edges of the aponeurotic opening closer together. It gives ready access to the pelvis and plenty of room for any pelvic work.

The incision through the skin usually falls below the pubic-hair line. When the hair grows out the scar is concealed. Particularly is this true when the patient is a brunette with a plentiful supply of pubic hair. I have patients that no one can tell that they have undergone a pelvic operation through the abdominal wall. Patients will often consent to an operation through the vagina, but will object to an operation through the abdomen on account of the resulting scar. This is particularly true of young females. If the scar is concealed this objection will be removed.

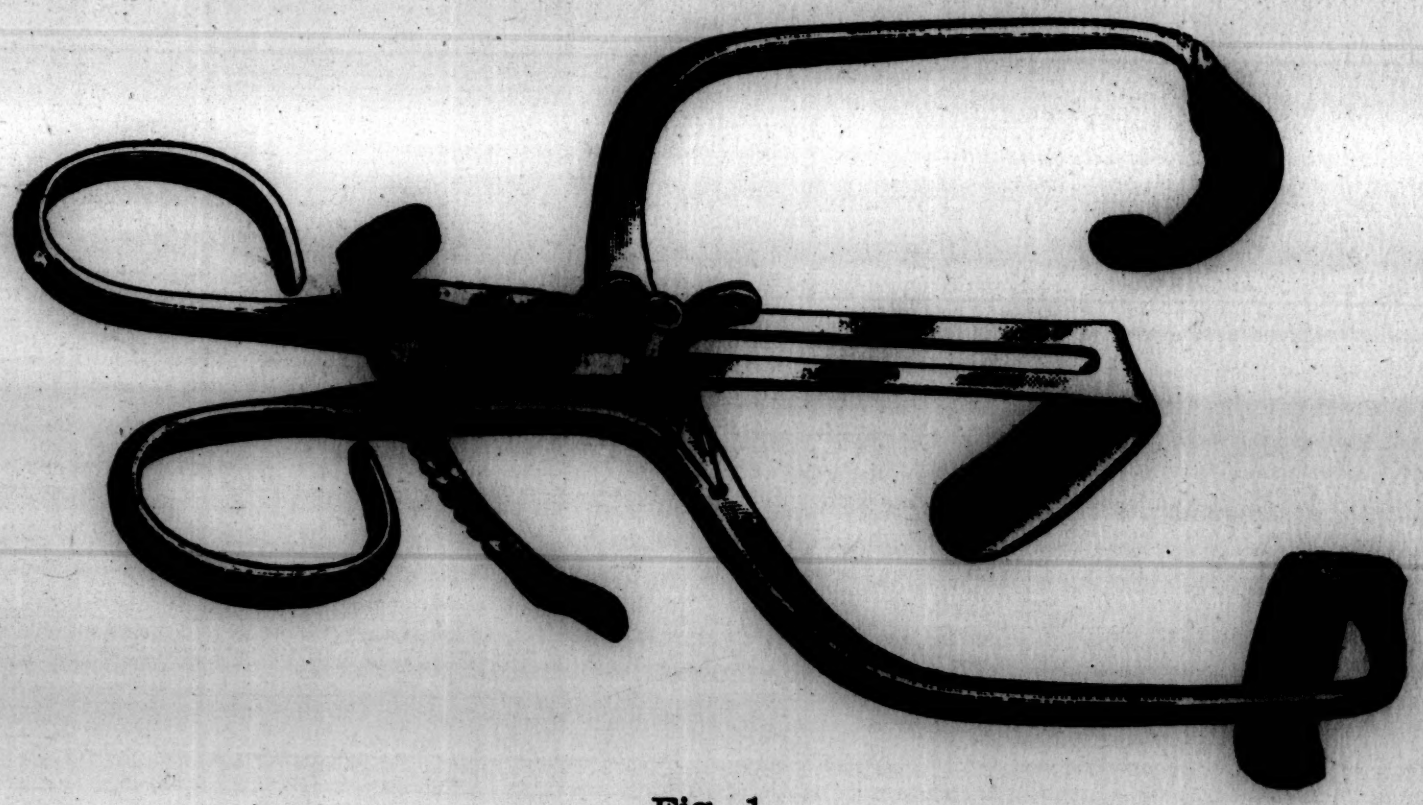

Fig. 1.

I submit a modification of the Mayo-Simpson retractor (Fig. 1) especially designed for use in the Pfannenstiel incision, although the third arm has proved useful in the ordinary longitudinal incision, in

holding back the lap-pads and preventing the retractor from swinging around to either side.

I have now used the Pfannenstiel incision in 112 operations. The first 30 were done with the cosmetic effect in view, and the transverse incision was made through the skin and fat, with a longitudinal incision through the aponeurosis and muscle. Then the strength of the closure, when the aponeurotic and muscular openings were made at right angles to each other, appealed to me, and I began to make the transverse incision through the aponeurosis also. The fact that the appendix was removed in 96 of these operations through this incision shows that it gives plenty of room to work through. In 3 of the operations, in which the appendix lay up behind the cecum, it was necessary to make an additional McBurney incision in order to remove it. In these three operations the appendix could not have been removed through the usual median longitudinal incision. In the 112 operations through this incision every variety of pelvic work was done, including 19 hysterectomies, some of which were for fibroids of the uterus. Some of the patients were very fleshy, so that fat is no bar to the incision. The gall-bladder can be felt and examined through it. Some of the operations were for pelvic inflammation in which pus was found, and the incision became infected, but, so far as I know, there have been no cases of ventral hernia. In a recent case the patient developed a severe cough immediately following the operation, but the incision did not separate. This incision can be placed a little higher for access to the central lower abdomen.

For the outer part of the lower abdomen McBurney's incision is usually the best. The aponeurosis of the external oblique and the internal oblique and transversalis muscles are split, thus avoiding the cutting of any nerves or blood-vessels, and the openings through

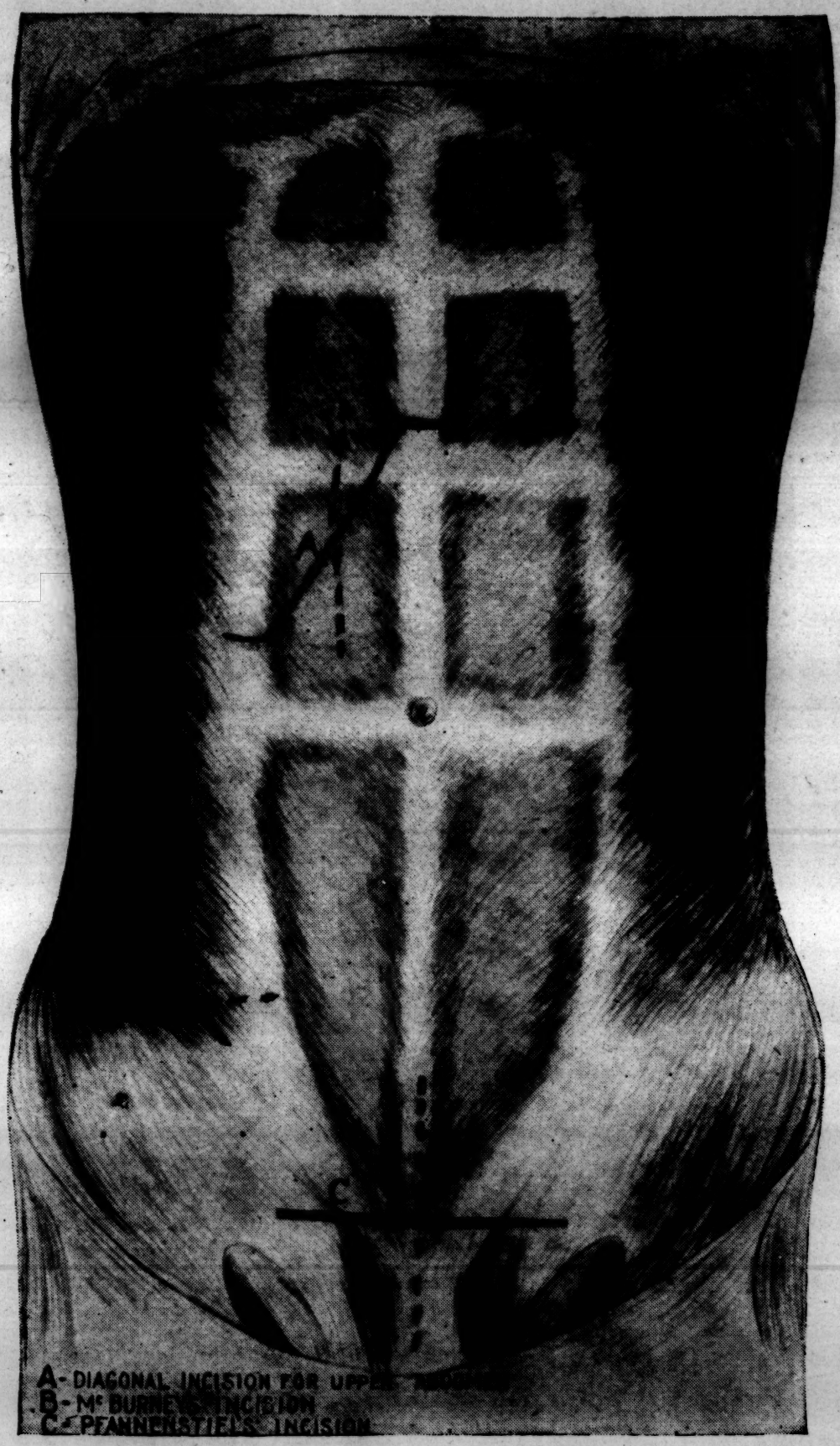
A- DIAGONAL INCISION FOR UPPE
B- Mc BURNEY'S INCISION
C- PFANNENSTIELS INCISION

Fig 2.

the aponeurotic and muscular structures are not in the same direction. If additional room is required, the split in the aponeurosis of the external oblique could be extended some distance in either direction. The opening in the internal oblique and transversalis muscles can be extended by cutting transversely across the semilunar line, and extended still farther into the sheaths of the rectus by retracting the rectus toward the median line.

The ideal incision for the upper abdomen would be transversely through the skin, fat, and aponeurotic structures (anterior and posterior sheaths of the recti muscles), with a longitudinal separating or splitting of the recti muscles. This gives a very firm closure, but does not give the access to the pathological lesion that Pfannenstiel's incision does for the pelvis and lower abdomen. I did a gastro-enterostomy through an incision made in this way, and the patient could have arisen and walked at once, so far as any pull on the edges of the incision was concerned; and in this particular case the operation was accomplished without much difficulty, but it was a favorable case, and it was seen that the incision did not give much room in which to work. In the upper abdomen the recti muscles are enclosed, both anteriorly and posteriorly, in a firm aponeurotic sheath that does not permit them to be retracted very far to either side when the sheath is incised transversely. In the lower fourth the posterior sheath is absent, which leaves them free to be widely retracted.

But a diagonal incision from the inner edge of the rectus down to the outer edge in the direction of the fibers of the internal oblique through both anterior and posterior sheaths, permits of better retraction and gives better access to that region. A transverse cut across the linea alba at the upper angle of the incision and a similar one across the linea semilunaris at

the lower angle, gives still more room in which to work. (Fig 2.) The rectus should be freed from the anterior sheath. This can be readily done by blunt dissection except when a linea transversa is encountered. In that case the dissection must be carefully done with a pair of scissors or a knife. It is very easy to cut across the rectus muscle at a linea transversa. The rectus is not adherent to its posterior sheath and the separation is easy. The rectus may be split or the entire muscle retracted to the outer side. If the muscle is completely mobilized, as it should be, it is usually easy to retract it entirely out of the way to the outer side of the incision. I have done gastro-enterostomies and gall-bladder work through this diagonal incision over the right rectus muscle with the transverse extension at either end. So far, this has been sufficient to give enough room to work in, but, if the occasion demanded, a similar diagonal incision could be made over the left rectus connected by the short transverse incision across the linea alba, and a very wide opening made, which would give access to the entire upper abdomen. This has been done on the cadaver, but I have not found it necessary so far in operative work. In this incision the openings through the aponeurosis and rectus muscle (if there be an opening made in the muscle) run in different directions. The incision in the aponeurosis runs in the general direction of the fibers of the middle side muscle, the internal oblique, and not at right angles to the general pull of the side muscles, as does a longitudinal incision through the linea alba or the sheaths of the rectus. It does not cut any intercostal nerves.

CONCLUSIONS

1. Abdominal incisions should be placed so that they will pass through both aponeurosis and muscle.

2. The incision in the aponeurosis and the split

in the muscle should run in different directions. This can be done in a large majority of abdominal operations.

3. A longitudinal incision should not be made through the linea alba or the sheaths of the rectus at a right angle to the combined pull of the three side muscles when it is possible to avoid it.

4. For very large tumors and cases where the character and location of the pathological lesion is in doubt, the longitudinal incision is probably necessary.

5. If the longitudinal incision is necessary, the split in the rectus should not be continuous with the aponeurotic incision, but should be placed to one side, and, preferably, through its inner half to avoid the intercostal nerves which enter the outer half.

6. It will take longer time and more experience to demonstrate the correctness of these conclusions.

DISCUSSION

DR. W. W. GRANT (Denver): Many years have elapsed since I have had any trouble with the opening of an abdominal wound from coughing or vomiting. I think that one reason for this is, that I use material that does not absorb in two or three days. In some cases there is vomiting which is rather persistent.

I make the usual longitudinal incision in the median line. I divide the muscles or split them, and when the operation is done this way in neither case do I have such results as have been mentioned. I unite the peritoneum first with simple catgut, and the fascia is brought together with chromicized catgut, which will not absorb for ten or twenty days. I generally fortify this with a mattress suture of catgut so as to overlap the fascia a little. I have, especially in fat patients, introduced, at times, a few interrupted, supporting, silkworm-gut stitches, not including the peritoneum, but fascia and skin. After uniting the skin with a subcuticular stitch I tie these over a fold of sterile gauze, making a roll the length of the incision. If this is done no amount of coughing or vomiting will cause the wound to open.

DR. HENRY T. BYFORD (Chicago): In the first place, I want to express my appreciation of Dr. Collins' paper and

of the principles involved. I think it is a splendid addition to our technic. However, I would differ with the essayist in one thing, namely, that any form of suture can be used to prevent hernia. There is always some reason for a hernia or the opening of a wound. If we depend upon through-and-through silk-worm sutures, we shall have support, but we shall not have a perfect coaptation. Again, if we depend upon catgut it may not stand the strain. Hernia has occurred, and will occur, in some of these cases. If we harden the catgut so that it becomes hard enough to stand the strain for a sufficient length of time, it has certain disadvantages that do not belong either to the non-absorbable suture, which is quickly encysted, or to the quickly absorbable suture, which is soon out of the way of doing harm. The infiltration around the absorbable suture weakens the line of sutures, and this weakening lasts until the suture is all absorbed, viz., two, three, or four weeks when the hardened catgut is used.

When we use catgut we should see that the edges of the tissue are properly coapted, and held right until union has occurred. The sooner it is absorbed after that the better, for the sooner will the tissues become firm. But the catgut should not have to stand the strain. Through-and-through silkworm-gut sutures should be used for that. As I always want to get my through-and-through sutures out at the end of a week I always feel safer with a few buried silkworm-gut sutures placed at the edges of the fascia and about an inch apart. They are quickly encysted, and the tissues about them are firm. A few fine plain catgut sutures between them may be used to hold the edges of the fascia until united, for there is no strain upon them, and they are absorbed in a few days, and are no longer needed.

Dr. John P. Lord (Omaha): I have been very much pleased with this paper. I am always pleased with those contributions that are in accordance with my rule of practice. I have observed these methods in general, but, at the same time, we all recognize their limitations. It has been my experience that where there is any particular doubt about the nature of the pathological conditions within the abdomen, the McBurney incision had best be eschewed, because, if we become overenthusiastic in the general use of that incision, we shall regret it in a number of our cases. Where we know beforehand that a large incision is to be required, I think the old classical procedures are necessary and that under these circumstances we should fortify our union with the best and strongest form of suturing we can give it. I hope

I shall not be misunderstood in this regard. I believe in the largest possible use of absorbable sutures, and that a long incision should be fortified in the way that has been mentioned, by the silkworm gut.

I commend especially the transverse suprapubic incision. The doctor has used it very much the same as I have done in my surgical work. My attention was first called to this by Dr. Peterson, of Ann Arbor, Michigan, who called attention to the advantages of this incision in dealing with pathological conditions within the female pelvis, where it is necessary to remove the appendix and where it is necessary to shorten the round ligaments at the same time. There are a few of these cases that come under our observation where just such conditions are to be met, including the desirability of avoiding a scar. I think that is particularly true in those females who are disposed to be neurasthenic and in whom the psychic influence of a surgical operation and the remaining scar may have their effect in after-life. I have used this incision only six times in young women. It gives one an excellent opportunity to liberate any adhesions within the pelvis and to deal with the tubes, ovaries, and appendix. At the same time, it gives one an opportunity to shorten the round ligaments. In all of my cases that was one of the procedures that was clinically indicated. In all of these the scars were no more conspicuous than those indicated in the photographs shown by the doctor. Union was perfect in every way, and it was my opinion that these wounds were less painful. There seems to be less traction from a transverse incision of this kind than where a longitudinal incision has been made. I believe that this is of some value. There has been some objection raised to this procedure because it carries us within a region in which infection is likely. I have not experienced this, and I do not believe that it is of sufficient importance to be worthy of consideration. We do not hesitate to make a scar on the face where the beard has been removed, nor in the axilla or anywhere else where hair grows. If there has been proper preparation and the usual precautions have been taken against infection, I think this danger is very limited.

I think the doctor's paper is timely, and I am sure we should all give more attention to operative technic.

Dr. C. H. Wallace (St. Joseph): I believe that we cannot in the general surgery of the abdomen pin our faith to any particular incision. It seems to me the most important factor is to make a constructive and not a destructive incision.

Probably the most important point Dr. Collins brought out was the importance of asepsis, if we expect to prevent ventral hernia. I have thought we may get a ventral hernia from ischemia from tight suturing. We all know that in these days of tier-suturing and cleanliness ventral hernia is the exception rather than the rule.

I sometimes believe that the muscle plays an important function in the prevention of hernia, and if the muscles are properly coaptated, without much tension, so as not to interfere with the circulation, we rarely get ventral hernia in clean cases.

Dr. D. S. Fairchild (Des Moines): In the absence of infection in an abdominal wound, when there is hernia following, there is a strong suspicion that the peritoneum has not been carefully sutured. It is very important to suture enough of the peritoneum thoroughly and carefully so that the stitches will not tear through.

Dr. O. H. Elbrecht (St. Louis): I would like the author of the paper in closing the discussion to dwell more on the cases that have to be drained. I have used this incision and like it very much for its cosmetic value, but when the pelvis is drained it is somewhat objectionable, and I would like to know what the author does in such cases.

Dr. Collins (closing the discussion): With reference to the remarks made by Dr. Grant and Dr. Byford, I will say that they have been fortunate, because if they will read Madelung's article they will find there a description of almost every form of closure which can be imagined, and the accident they speak of has occurred. While we know that a great many operations are done in which numerous methods of closure of the incision are practiced and there has been no separation, yet it has occurred with every form of closure. Madelung's conclusion was that the kind of suture was not much of a factor in producing the accident.

In regard to what has been said by Dr. Lord: I covered the points made by him in my conclusion when I said that for large tumors, and in cases where the character and location of the pathology is in doubt, a longitudinal incision is necessary.

In regard to drainage: It has been my plan where the infectious material is low in the cul-de-sac to drain through the vagina beneath the cervix. If most of the infected tissues seems to lie closer to the abdominal wall, then I would make a separate stab-wound through the abdominal wall.

THE SIGNIFICANCE OF TENDERNESS IN LOCATING LESIONS OF THE VISCERA

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BUTTE, MONTANA

The term *tenderness* is used in its broadest sense, signifying an abnormal sensibility to touch, and may be defined, in one instance, as hypersensitiveness and, in another, as actual painfulness. Since the examiner awakens this tenderness through touch, and as it is usually accompanied by such objective symptoms as local muscle spasm, movement of the body, facial expressions of discomfort, heightened pulse, dilation of pupils, etc., it should itself be spoken of as an objective symptom. Subjective pain, while frequently associated with tenderness, is not, by any means, always coincident with it, either in time or location.

In a certain percentage of visceral lesions, tenderness is present; particularly is this true of the abdominal viscera. This symptom is always sought, especially when pain is complained of, and it is relied upon to a large extent in locating the seat of disease. No attempt will be made to show that it is pathognomonic of certain lesions, though the character of the tenderness may help materially in making a diagnosis. The location of the tenderness, also relied upon to fix the seat of the lesion, because of the variations in the relative position of some of the viscera, the juxtaposition of certain frequently involved organs, and the variable

degree of fulness of the abdomen, is somewhat untrustworthy at times.

The question of locating a lesion of an abdominal viscus that is accompanied by pain, has, in recent years, awakened considerable interest in the medical ranks. At first it seems only natural that a diseased organ should suffer pain at the seat of the lesion, but of late this has been seriously questioned and by some absolutely denied. In Hilton's classic little book, "Rest and Pain," attention is directed to the fact that pain is often felt in an area of peripheral nerve-distribution though the lesion be deep-seated. Reasoning from clinical data, he ascribes this to the fact that certain peripheral nerves have a common source of origin from the spinal cord with deeper fibres which supply the internal organs.

Gaskell undertook to demonstrate anatomically this association, and published his results in the Journal of Physiology, Vol. 7, 1886. The medullated and non-medullated nerves of the sympathetic system were traced to and from the cord, and a scheme of their distribution to the visceral and vascular systems was given. He dealt, however, largely with their inhibitory and motor function. Edgeworth published in the same journal a later article confirming Gaskell's results. In 1893 Mackenzie published a paper in "Brain" in which he contended that the pain felt in diseases of the viscera is a referred sensation, being manifested in certain peripheral nerve-branches having a common origin from central spinal segments with those nerves which supply the viscera. He argued that the viscera have no sensory nerve-fibres to conduct pain. Very recently, in the British Medical Journal, Vol. 1, 1906, he reiterates his former views and endeavors to show that the tenderness seemingly located in a viscus is, in fact, awakened in the muscle and connective tissue overlying the viscus. Ross, in a paper entitled "Seg-

mental Distribution of the Sensory Disorders," which appeared in "Brain," Vol. 10, 1888, presented views which coincide with those of Mackenzie except that he does not insist upon the impossibility of visceral sensibility. Maylard, in his book upon "'Abdominal Pain," quoting from a paper by Head on "Disturbances of Sensation, with Special Reference to the Pain of Visceral Disease" (Brain, Vol. 16, 1893), gives the following, indicating the lines upon which he worked:

Pain was, in many cases, associated with definite cutaneous tenderness. Moreover, the cutaneous tenderness was, in many cases, not confined to small spots or areas, but occupied whole tracts of skin with definite borders. I was thus led to investigate the pain accompanying tenderness consequent on disturbances of other organs, and I found that these sensory disturbances also followed definite lines. After Ross' most suggestive papers, it seemed exceedingly possible that these areas bore some definite relation to nerve-distribution, and I then began to investigate the distribution of herpes zoster in the hope that a skin lesion, which was notoriously of nervous origin, might throw some light on the meaning and significance of the tender areas in visceral disease. To my surprise, I found that the areas occupied by herpes zoster exactly correspond to those with which I was familiar in visceral disease. I next attempted to determine to what level of the nervous system these areas belonged with the help of cases in which gross organic lesions were present. By this means, it became apparent that each of these areas represented the distribution of a single segment in the spinal cord. Thus I was enabled to map out the areas supplied by the various segments of the cord on the surface of the body. It then became apparent that certain of these areas were never affected in visceral disease, and this led me to examine the sensory supply of the viscera from the sympathetic system. Now, Ross had already suggested that in visceral disturbances, pain, and therefore tenderness in my cases, was referred along the distribution of the somatic nerves which came off from the same part of the cord as the sensory sympathetic fibres to the organ affected. Thus, if I could map out the somatic areas along which pain was referred in visceral disease, I could say, on Ross' hypothesis, what was the sensory supply from the sympathetic of the particular organ affected. By this means, I obtained another scheme showing the distribution of the sensory

sympathetic fibres analogous to that which Gaskell constructed for the motor and inhibitory fibres of the same system.

In this scheme of Head's, the areas of cutaneous tenderness do not overlap and there are usually two points at which the greatest sensibility is noted, one anterolateral and the other posterolateral, the so-called nodes of Valle.

In recent times the Swedish surgeon, Lennander, has attempted to prove the insensibility of the abdominal organs. He made use of Schleich's solutions to open the abdomen, and demonstrated the insensitiveness of the viscera to handling and to various stimulants. He found only the parietal peritoneum and mesenteries painful to irrigation, and in those structures sensibility to heat, pressure, and cold were lacking. The organs were cut and handled without pain. The impression of pain in the abdomen, according to his views, ascends over the two phrenics, the six lower dorsal, the lumbar, and the sacral nerves, none of which supply the organs of the abdomen.

Unlike some of his predecessors, his explanation of how the somatic fibres are awakened into painful transmissions is not by a similar origin of visceral and somatic nerve fibres from the same segment of the spinal cord, but direct transmission of irritating substances from the visceral lesion through the lymph-channels to the somatic or mesenteric fibres or by a direct mechanical irritation of these fibres.

In the Medical Record of December 29, 1906, L. Kast and S. J. Meltzer take issue with Lennander. They apparently demonstrate that the use of cocaine induces this visceral insensibility. Dogs were laparotomized under ether, and while the abdomen remained open they were allowed to come from under the influence of the anesthetic. If then the viscera were handled, clear evidence was given of pain. If, on the other hand, cocaine was injected, this evidence of pain

disappeared. The experimenters, reasoning upon this evidence, assert that the abdominal organs do possess sensory nerve-filaments, which are put out of function by cocaine.

To those familiar with operative work upon the abdominal viscera, under the influence of a local anesthetic, the lack of acute sensibility of the organs is well known. I have repeatedly cut, caught with forceps, and sewed the various organs without awakening pain or noticeable discomfort. The important points in this local anesthetic work to me were the necessity of infiltrating the parietal peritoneum in the neighborhood of the wound to lessen painful contact, and the avoidance of traction upon the organs handled or operated upon.

The objections which I should offer to the deductions of Kast and Meltzer are—

1. There is no valid reason why the nerves of pain-conduction in the splanchnic system should materially differ, chemically, from those of the somatic tracts. This being so, there can be no reason why a very minute dose of cocaine should block impulses over the one set and not over the other set of nerves when not applied directly to them.

2. The use of salyprin, eucaine, and even water, in my experience, has been efficient in bringing about the same result as that obtained by cocaine.

3. In several instances I have operated upon the gall-bladder and upon the bowels without any anesthetic and caused no acute pain.

Thirteen years ago I had my first opportunity to demonstrate this possibility in a patient upon whom I had done a left inguinal colostomy because of a vesico-rectocutaneous fistula. I discovered, after the operation, that the spur had not been made long enough to prevent some liquid matter of the bowels from going on into the distal gut. To overcome this, I divided

the mucosa and submucosa of the opened bowel and completely closed the distal portion. The patient assured me that it did not cause great discomfort. I have twice since opened the gall-bladder twenty-four hours after exposing the viscus, and in neither case did the cut cause pain.

I think it is generally accepted by surgeons that the viscera do normally possess sensibility in moderate degree. This sensibility is comparatively poorly developed in them when contrasted with that possessed by the peripheral tissues. Under the influence of disease or irritation, this very moderate capacity of a viscus to suffer pain increases to a marked degree. I have seen in a patient during an operation apparent insensibility followed by acute suffering. The patient was starving to death from an esophageal obstruction, supposedly cancerous. I performed a Kader gastrostomy under a local anesthetic. The first part of the operation was carried out without signs of discomfort. The abdomen was opened, the stomach picked up and incised, a rubber tube was inserted, and the first stitch taken, seemingly without pain. The second row of invaginating stitches in the stomach-wall caused very considerable pain. The same portions of the stomach-wall, which had just previously been caught with the forceps without discomfort, began to evidence this marked sensibility to the stick of the needle. At first I thought the pain was of purely psychic origin, but found that the patient, who was not able to see what was happening, complained of each introduction of the needle. It might be argued as the result of Kast's and Meltzer's experiments that the effect of the anesthetic had worn off and pain was the consequence. This I do not believe, as the time between the period of complete comfort and suffering was too short. On the other hand, I believe that the continued irritation of hand-

ling the stomach awakened this heightened sensibility. The fact is, that congestion and especially inflammation will accentuate irritability in all tissues, as, for example, the intolerance of an inflamed gum to the touch. I have observed a number of times that celerity and careful handling had much to do with the painlessness of an abdominal operation under local anesthesia. Whenever, from one reason or another, time is consumed in the work and much handling has to be done, the patient invariably becomes restless and complains of discomfort. If this factor, time, be explained by the experiments of Kast and Meltzer, then we would have a remedy most valuable in colics, stomach ulcers, and visceral lesions producing pain. A small injection of cocaine in non-toxic amount would serve to relieve every pain of visceral origin. Such is, as we know, not the case. I am confident, after a very considerable amount of work on the abdominal viscera under local anesthesia, that the increased sensibility of the abdominal viscera of the dogs laparotomized by Kast and Meltzer, and wakened from the anesthetic before attempting to produce pain by handling, was due to heightened sensibility, the result of exposure of the viscera and, more probably, irritation of the parietal peritoneum and wall also.

The one thing is definitely certain, abdominal visceral lesions do cause pain at times. Now, if the viscera have no nerves of sensibility, as insisted upon by Mackenzie and by Lennander, how can a purely visceral lesion give rise to pain? The viscera evidently do possess nerves for afferent conduction. Naturally, the question is raised, do these afferent fibres conform to the type of the pure pain-conducting fibres of the rest of the body, or are they of different type, only awakening painful impulses in the cords? This reminds me very much of the question asked by a philosophic school-girl in class upon one occasion. She desired

to know whether Homer really wrote the works of Homer, or were they written by another man by the name of Homer.

The question of pain being located in a viscus and referred specifically to its seat, and the further question of pain being referred to certain somatic nerve areas, is different from that discussed above. The anatomy of the visceral nerve-supply would at once indicate the reason for the difficulty experienced in locating pain which takes origin from a viscus. The distributory function of the ganglia brings into close association the various organs, and pain-impulses might readily be interpreted as coming from a healthy viscus. It seems reasonable, however, that pain coming from a viscus should reach the sensorium over tracts which enable the individual to become conscious, in a general way, of its location. It must, furthermore, be stated that there is no proof that all afferent nerve-fibres have functional nerve-contact with the sympathetic ganglia cells. Some may pass directly to the cord and carry impulses which enable the individual to locate their source.

A most interesting phenomenon in connection with visceral lesions is the pain and tenderness observed in somatic areas. All visceral lesions accompanied by pain show a marked tendency to awaken irritability along certain somatic nerve routes. This is the referred pain to which Hilton, Gaskell, Edgeworth, Ross, Head, Thorburn, Mackenzie, Lennander, and others have directed attention. All of these writers have shown that visceral disturbances refer pain in part, and, some insist, altogether, to areas of distribution of sensory somatic fibres, which fibres, as a rule, take origin from the same spinal segments as the visceral fibres. While it may, in part, be explanatory to refer pain of visceral origin in somatic areas to the common origin of the splanchic and somatic nerves from the same spinal

sensations, yet this is not fully explanatory. In fact, it does not explain those pains in somatic areas, the nerves supplying which take origin from entirely different segments of the cord from those of the viscera at fault. It is a common observation that pelvic disease may manifest pain in the intercostal nerve-area, and, *vice versa,* pneumonia may be mistaken for peritonitis or appendicitis. Another interesting observation is that of a crossed sensation in which the somatic response is upon the opposite side from the viscus, the seat of lesion. The most reasonable explanation of co-sensation is the close association of afferent nerve-tracts in the cord. Whether we ascribe nerve conduction, from the periphery to the brain, to the association of neurons, either by the neuroglia movement of Roman y Cajal or by the neurons themselves moving, it matters little. One thing seems reasonable, that is, an oft-repeated action is easier accomplished by the group of cells accustomed to that certain action than by a new combination of cells. It is possible, even probable, that an afferent impulse reaching the spinal cord from a viscus awakens, by close association with some somatic, sensory nerve-cells, an activity which is transmitted to the brain over the ordinary route of somatic pain. In other words, these visceral afferent impulses seek, on reaching the cord, the easy route of impulse, and are interpreted by the higher center as somatic in origin. This, too, explains the method by which these visceral disturbances awaken pain in somatic areas whose nerve-supplies come from spinal segments above or below the segment into which the afferent visceral nerves pass.

DISCUSSION

DR. HENRY T. BYFORD (Chicago): I do not know very much about this subject, and I imagine there are very few who do. However, I venture to say a word or two from a practical standpoint.

With regard to the nerves of the visceral peritoneum: I think it is all a matter of evolution as to how little or how much they act. We know that in the process of evolution the nerves of the skin have become sensitive in a certain way and those of the viscera in another way. That there are functionating nerves of sensation there, I know, because I have seen their effect. I was called once into a saloon to see two men who had been shot in the abdomen. Both of them were holding their bellies and writhing in pain as if they had an attack of colic.

With regard to this nervous distribution and differential development: We have an illustration in the cervix uteri. We can pull the normal cervix down by tenacula, cut it or apply cautery, and the patient does not feel it. When the cervix is inflamed or congested these nerves become more sensitive and it sometimes hurts the patient to wipe off the mucus with cotton. So the nerves of sensation are there and are capable of functionating although they are not very well developed. If we dilate the normal cervix the patient complains bitterly. The nerves of sensation have been developed to a certain kind of function by labor, by pressure of the fetal head, dilatation, etc. So I think it is a matter very largely of evolution. The nerves are there and are probably more or less distributed all over the organs, but their function varies in kind and intensity.

With regard to areas of pain: It is not a simple matter for us to understand them. I had a case recently of a woman who had been sick for two years. One physician repeatedly diagnosed gall-stones; another man diagnosed several attacks of appendicitis. She came to me, and as I was a gynecologist I diagnosed pelvic trouble. In examining this woman I found I could elicit pain over the gall-bladder, and by examining her more carefully I found I could get a corresponding pain on the other side. There was tenderness over McBurney's point; but I found that on the opposite side of the umbilicus I could also get a tender area. I could get tenderness also in the pelvis. I operated, made an incision over the pubes, and found tuberculous disease of one ovary and tube and pelvic peritonitis. She had had attacks of gastric fermentation; she had had attacks of vomiting; she had had pain with elevation of temperature and pain without temperature—all of which accounted largely for one man making a diagnosis of gall-stones and another making a diagnosis of appendicitis. In a case like that the areas are mixed up and multiplied, and the diagnosis is not easy. It is necessary to know how to

eliminate pains and areas and symptoms. I have mentioned the case to illustrate the point that we should not rely too much on tender areas.

Dr. A. E. Hertzler (Kansas City): In considering this subject it is worth while to think of the distribution of the peritoneal nerves. The nerves in the peritoneum are like the nerves in the skin: when not disturbed, they raise no disturbance. Large areas in the peritoneum can be found in which there are no nerves, and of course these regions are not sensitive. Take, for instance, the average hernial sac. If one avoids the nerves when the canal is exposed, he can do as he wishes to the peritoneum without the patient knowing anything about it. On the other hand, when regions are attacked in which there are nerves very acute pain is elicited. I have observed this in one operation for hernia in which cocaine was used. I believe as a regular thing in a hernia, before the sac is tied, it is not particularly sensitive, yet when it is ligated the proximal part of the peritoneum becomes tender, due to the nerves having been pressed upon by the ligature, the nerves thereby being rendered sensitive.

In a layer of sutures, another point is the degree of vascular disturbance, and, unquestionably, it is an important element, permitting hyperemia to come about, or, if the time is sufficiently long, permitting any exudation which goes with that prolonged hyperemia. I would suggest that the essayist can demonstrate the correctness of his theory any time he wishes if he will cause that hyperemia by the addition of pressure with hot water, or simply by the application of a dilute solution of adrenalin, which causes the tenderness to subside.

Dr. Charles E. Bowers (Wichita): I think there is no question but what the investigation that is now being made in regard to the sensory nerve-supply to the peritoneum, visceral and parietal, is very important, and yet at the present time it is less understood than any other subject which concerns the general practitioner and the surgeon. There are surgeons and there are doctors who make tenderness and evidence of pain an important diagnostic symptom. There is no evidence that comes to the general practitioner or to the surgeon that may be more misleading than the evidence of pain. There are more mistakes made to-day upon that theory than upon any other. The enlightenment of the profession has yet to come. Those who are identified with the Upsala Institution have probably been the closest observers, and, collectively, surgeon, anatomist, and physiologist have been unable

to determine by experimentation that there are nerves of sensation supplying the visceral peritoneum.

Lenander read his paper before the American Medical Association, which was controverted by the Rockefeller Institute. There are some good things that may come from the Rockefeller Institute. The experimental work there was done entirely upon the lower animals. No experiments on human subjects were reported. It may not be true, yet I believe that the lower animal has the same nerves of sensation supplying the visceral peritoneum as exist in the higher animal or human being. But every one who has done surgery cannot believe that local anesthesia will abort all pain in the abdominal cavity, which was offered as an explanation for the findings of the Upsala School in their experimental work. There is not a modern anatomist who can trace sensory nerves to the visceral peritoneum. There are reported cases of gastric ulcer that have perforated, and the first symptoms known was pain after perforation, the ulcer in the stomach not having caused any pain apparently before its perforation. It is likewise true of typhoid ulcer. Perforation has taken place, and the first evidence of the pathological process has been after perforation. A pathological condition may be present sufficient to destroy the continuity of the viscera without causing pain. And so we have something to do before we can settle this question. There is something for the future investigator to do. We know very little about this matter. We are still in ignorance. One year ago the Lennander School was recognized the world over, but after the Rockefeller Institute inaugurated its reply to that school, to-day we are on the other side. The pendulum swings one way at first and then the other way, but we positively do not know. We are in the dark, and it remains for the future investigator to solve the problem.

Dr Witherspoon (closing the discussion): I think I have said all that ought to be said, except to state that an ulcer everywhere may or may not cause any pain. We have all seen cases of absolutely painless ulcer, and there is no reason why the same condition may not exist within the abdomen. We have seen cases of painless typhoid-fever ulcer. Again, we will see cases of pre-perforation that are absolutely without symptoms, and there has been no way of predicting or foretelling that perforation is going to occur. The question, however, of interest is the significance of this tenderness that we are able to elicit. The subject is so large that I had to treat it in a very haphazard manner. Unquestionably, a great deal can be done with an intelligent touch to determine

the point of the lesion, and a diagnosis may be arrived at in a reasonably large proportion of cases. The question of tenderness of the gall-bladder, of the appendix, or the pelvic viscera in a patient is simply one where a nice differential touch is going to be of value.

AN EXPERIMENTAL STUDY IN THE ETIOLOGY OF CANCER

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I

When Sudan III, dissolved in olive oil, is injected immediately beneath the epithelium of an animal, an interesting series of phenomena develop. Within two days the lower layer of cells of epidermis become pointed, and in two more days these cells are seen to invade the connective tissue below. In ten days the cells have formed nests in the subcutaneous tissue resembling very closely the cancer nests in a beginning epithelioma. These proliferating masses are confined to the region acted upon by the chemical injected. Many regions show a pearl formation, but it is difficult to say whether these are analogous to those formed in epithelioma or not. Proliferating cells about hair follicles resemble pearls very closely, and I am not prepared to say whether these are all of this character or whether some really resemble entirely the pearls in cancer. A reference to the accompanying figure conveys a notion of their appearance. In the same section from which the drawing was made a cell-nest is located at a depth considerably greater than the lowest cells in the drawing. In this nest a keryokinitic figure exists.

I have tried out a large number of stains, and, except those belonging to the OH group, all were nega-

tive. These studies are still under way and will be published in detail later on.

II

In a recent paper (Journal of the A. M. A., February 8, 1908) I discussed the results of the experiments above detailed and their relation to the etiology of cancer. The paper, as published, was written in October, 1869, and was read before the South Kansas Medical Society in December of that year. In November of the same year Fisher published a paper (Munch. med. Woch., No. 42, 1906) detailing similar experiments. I was unable, however, to obtain his paper until some months after it appeared. His deductions were so different from my own that I decided to publish my paper as presented to the society above mentioned. I desire now to compare Fischer's deductions with my own.

In my paper I assume that the balance between epithelium and connective tissue is a chemical one, and that, when such balance is distributed, the development of one tissue at the expense of the other is possible. This hypothesis was based on the different tinctorial reaction of epithelial and connective tissue. Partly on clinical and partly on chemical grounds, I assumed that the connective tissue is an acid one. The chemistry of the action of dyes on living tissue is still very uncertain. However, the details of such action are of little importance. The vital question is, Can the development of epithelium as it occurs in these researches be explained on any chemical hypothesis, for the sole merit of these experiments, in my opinion, consists in the fact that epithelial proliferation can be excited by the use of known chemical elements?

Fisher's results were obtained in a purely empiric manner, and as an explanation he coins the term *attraxine*. The chemical used is supposed to "attract" the epithelium toward it. The designation seems to

me to be an unfortunate one, for, whatever the influence of the chemical may be, it is to excite the epithelium to biological activity and is no sense a "drawing to." At best it is a designation for a group of phenomena and is in no wise adequate to explain their occurrence.

Those dyes belonging to the OH group only are active. Some of these at least are acid.

Numerous experimenters have been able to reproduce results similar to those of Fischer and myself, but one experimenter has failed, and this paper has as a merit the fact that it emphasizes the liability of mistaking oblique sections of hair follicles for artificial cell-proliferation. In my own experience this is more likely to occur the younger the animal employed.

It may be accepted then as indisputable that epithelium may be made to proliferate by the injection of certain substances. These newly formed cells undergo a degree of anaplastic change, and keryokinetic figures have been observed, as above noted. These proliferating areas may or may not be surrounded by leucocyte infiltration, but I have not noted in any instance any real round-celled infiltration as seen in epithelioma.

The explanation of these peculiar phenomena is at present impossible with any degree of certainty, yet there are certain facts that are worthy of note. The dyes, the use of which results in such proliferation, are such as act upon the fat or connective tissue. So far as is known, dyes stain by forming a chemical combination with certain elements of the tissue. It would seem fair, then, to assume that any action a dye may have is expended upon the tissue for which it has affinity. All chemicals which have this power of causing epithelial proliferation are connective-tissue stains, with the possible exception of carmin, and all nuclear-staining dyes are entirely negative in their

reaction. It would seem, if Fisher's explanation were correct, namely, that the influence is upon the epithelial cells, that the epithelial stains, which are known to have a specific action for epithelial cells, would be the ones to cause such proliferation. I have tried all of the common nuclear stains accessible, and, with the possible exception of carmin, which is an acid stain, all were negative.

Most observers express a common agreement that proliferation brought about by the above experiments has nothing whatever to do with the epithelioma. It is quite possible, it seems to me, that these statements have been made with unwarranted emphasis. The proliferations, produced by a single or a few injections, are, it is true, limited in their extent, yet, on these grounds alone a fundamental dissimilarity to epitheliomatous cell-development should not be declared, for it is not surprising that any causative factor, acting for a few weeks at most, should fail to produce epithelioma, for, as much as we know of the action of causative factors in epithelioma, they are active for long periods of time before malignant growths develop. It would be unlike the natural processes, therefore, if any of these chemical substances should produce, in a few weeks, a true cancer. The failure of these new proliferations to form metastases need occasion no surprise, for, if these cells were transplanted into other regions of the body where the resistance of the tissues had not been weakened by the action of, say, Sudan III, these cells would, according to natural laws, be unable to proliferate.

One sees in these injection experiments that in fixed specimens the connective tissue about these proliferating masses has lost its affinity for the fuchsin or other connective-tissue stain. Some change has occurred, therefore, *in vivo*. Whether this is the result, or the cause, of proliferation, or whether both are due to a

Showing the appearance of the pearl formation.

third factor, is the real question at issue. About beginning epitheliomas one finds this same condition in connective tissue. The question here is the same, Is the connective-tissue change primary or does a developing epithelioma cause it, or are both the epithelial proliferation and change in the connective tissue due to a third factor? Examination of a large series of epitheliomas has convinced me of the parallelism of these problems.

The objection may be raised to my hypothesis that, even if the primary development of epithelium be due to a lessened resistance on the part of the connective tissue, this would not account for the limitless growth and the ability to form metastasis. We know, however, that as epithelium develops in any epithelioma, specific changes occur in cell-structure (anaplasia, Ruckschlag) as the tumor grows. There is evidence, because of their change in staining characteristics, that these cells, as they gain in proliferative power, develop progressively more affinity for the nuclear-staining dyes, therefore, more of those elements which are opposed to the connective tissue. Thus, cells which at first are able to proliferate in a region of lessened resistance only, by their growth gain power to proliferate in regions of normal resistance. When this point is attained limitless growth and the power to form metastasis are possible.

DISCUSSION

Dr. Charles H. Mayo (Rochester): One would think from the remarks of the essayist that cancer of the duodenum is rather common, while in fact it is a rare condition, and cancer of the stomach will stop itself right at the pylorus. Our experience has taught us that we may have an enormous amount of cancer about the duodenum, and yet the duodenum itself may not be involved. It is rare, indeed, that cancer of the stomach will advance into that tissue.

Dr. M. L. Harris (Chicago): The essayist mentioned that this is the first time a definite substance has been used to

bring about epithelial proliferation. I am surprised he did not mention the work of Fisher, in which he used Scarlet R to produce changes in the epithelial cells, as he pointed out that it had a specific effect in causing the proliferation of epithelial cells and produced typical epithelioma so far as the pathological condition went. That was the first demonstration of a specific substance which possessed a specific influence in causing typical proliferation of epithelial cells.

DR. HERTZLER (closing the discussion): To begin with the point made by Dr. Harris I will say, I am perfectly familiar with the attitude of Fisher. His experiments are later than my own. His publication appeared last November. Scharlach R works exactly the same as Sudan III, and Fisher's experiments show that there were several failures which apparently have not been recognized, and Johns Hopkins men fell into the same trap. A pathologist in this city (McConnell) noted the error without calling attention to it. Fisher became confused in the histology of the epithelium and endothelium, I am sure. As I have indicated on the drawing which has been passed around, there is difficulty in distinguishing between the epithelium and endothelium surrounding blood-vessels. Fisher calls attention to the formation of epithelium around the fat globules. These are not epithelial but endothelial cells.

As to the difficulty of distinguishing between epithelioma and endothelioma: If one searches through the specimens carefully in connection with the old question of differentiation between epithelioma and endothelioma, he wonders if the whole thing is not to be thrown up in the air again. Fisher has done what I did not do,—and I tried to emphasize that without going into details, which would lead us into endless difficulty,—and that is, Fisher used the word "attraxine," which is simply a name for something we do not understand. I substitute for Fisher's "attraxine" the chemical hypothesis which I enunciated.

The most valuable work I know of has been done by McConnell, of this city. He has given us a clear presentation of many facts which Fisher overlooked, and among them this, that these cells about the oil globules go ahead and form fibrous tissue. Fisher made a few experiments, and so did McConnell and the Johns Hopkins men; but if one follows these up he will see that we must do more than inject nine rabbits and then examine them in two weeks. One must examine hundreds of them at periods varying from 12 hours to several months in order to trace the difference, and to distinguish between the various cells.

To go back to the first speaker: That would bring up the law of chemical influence which I purposely avoided. I have already apologized for a distinct jar in the application of the theory. I apologized for that when I admitted the possibility of the importance and the overproduction of the basic elements in the cell. In that event the action of acid might act as a stimulus to the epithelium, acting as an excitor in the first series of phenomena, while a reduction in the acid resistance would belong to the second and more important class.

After all, one has a very different factor to combat. We know that carcinoma of the small intestine is very rare. We come in contact with a variety of phenomena totally distinct from the application of my theory altogether, and that is the action of the intestinal juices on nuclei, because in the presence of this ferment—and that is the basis of Bier's use of trypsin in the treatment of carcinoma—it is distinct from the application of my idea. The trypsin acts upon the cells and prevents the growth of any epithelium with which it comes in contact. One can study that in the peritoneal cavity in the prevention of intestinal adhesions. That is totally different and apart from the alkaline action of the chemicals that may go on in the region of existing ulceration. There we have the application of my hypothesis vitiated by the action of the trypsin, and that already is indicated by the rarity of carcinoma in the small intestines.

One gentleman has suggested that the secretion of the vagina is acid while that of the cervix uteri is not. Normally, the secretions of the vagina in its lower part are perhaps slightly acid, but if my observations have served me right the cervical secretion in cervicitis is not ordinarily acid in character. In some conditions perhaps the secretion may be acid; yet, after all, that might be merely a confirmation because of the increased percentage present of certain acid elements in the epithelium. That may be considered as a precancerous stage, and not the ordinary secretion of the cervical glands.

PREPARATORY AND POST-OPERATIVE TREATMENT

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As a rule, preparatory and post-operative treatment, aside from the sterilization of the operative field and the dressing of the wound, has more to do with the comfort of the patient than with his recovery, for emergency cases very commonly do well, and we frequently perform successful operations away from home and leave the after-treatment to a physician little skilled in the care of surgical cases.

In all but exceptional cases, where some organ—the bladder, for example—has to be prepared for operative procedures, prolonged preparatory treatment is unnecessary and inadvisable. It is not in keeping with modern surgery that we should "operate our patients off the street," but it is sufficient to have the average patient enter the hospital on the day preceding the operation.

Much harm is being done by starving patients and giving them heroic doses of cathartics before operation. An operation of sufficient importance to require any preparatory treatment is a trying ordeal for the patient, and should be prepared for as for any other trial of endurance. The patient's resisting powers should be brought up to the highest possible standard. We should not think of preparing a person for any other trial of his strength by hypercatharsis and starvation diet. On the contrary, we should give him

good, nourishing food and keep his bowels regular. If a patient were to come to us weakened by a diarrhea, we should naturally build him up before performing an important operation upon him. Why then should we weaken him by cathartics before operation? When a patient's bowels are regular, he is better without a cathartic, except in abdominal and rectal cases, and he should have regular diet up to within a few hours of the time of operation. In weak patients, and where a very severe operation is to be performed, a hypodermic of one-thirtieth of a grain of strychnia, just before operation, is helpful.

The operative field should be shaved, thoroughly disinfected, and a sterile dressing applied the evening before the operation. The application of wet dressings of soap poultices at this time is objectionable, because they are unnecessary and are very liable to deprive the patient of a necessary night's rest. The field should be thoroughly rescrubbed with soap, water, and gauze just before the operation. It is a mistake to use a stiff brush so that the skin looks like a boiled lobster. Bichloride and other chemical solutions are usually applied at this time from force of habit, but, as now used, their value is certainly questionable, and they will doubtless soon be discontinued, just as many other useless things have been eliminated from our technic. Ether should be used when the skin seems oily, and finally alcohol, to harden the skin and close the pores.

The average patient fears the operation much less than he does the anesthetic, and it is very helpful to be able to say to him that the person who will administer his anesthetic has had a large experience, and gives it so that the patient does not suffer and is certain to regain consciousness. Every operating-room should have an experienced anesthetist, because it adds to the patient's comfort and safety, and allows the surgeon

to give his undivided attention to the operation. No one thing has added more to my comfort and success than my trusted anesthetist, who has served me faithfully for several years. Many patients have lost their lives because the anesthetic was so poorly administered that technical mistakes were made while he was being resuscitated.

There are many things pertaining to the operation itself which have a decided bearing on the after-treatment. Careless and rough handling of the patient while he is unconscious is a common cause of discomfort and pain afterward. While unseemly haste in an operation is to be deprecated, we should not keep the patient lying on an iron table and inhaling the anesthetic any longer than is absolutely necessary, because the former causes backaches, and the latter is conducive to bronchitis, pneumonia, and nephritis. There is no doubt but that the hard operating-table is the cause of much discomfort during convalescence, and clean pads and cushions, well covered with sterile sheets, should be placed between the patient and the table. A groove running lengthwise in the table prevents undue pressure upon the spinous processes, and saves subsequent suffering from that source. The severe post-operative backache, as commonly complained of, is due to the bruising by the hard table, and to the spraining of the muscles of the back from a faulty position maintained for a long time. The spraining can be prevented by placing a pad under the small of the back during the operation, so that the natural forward curve of the spine in the lumbar region cannot sag. In our northern climate, no operating-table should be without a heating device for cold weather. The electric is the most elegant and convenient, but a hot-water tank or coil is equally efficient. Our tables all provide for drainage now, and we should see that the drainage is not so interfered with that the

patient lies in a puddle of water during the operation.

The patient always thinks the stitches and bandages are too tight, and it is very important that the surgeon should know that they are not so. Most stitch abscesses are caused by tight sutures, and tight bandages have been the cause of untold suffering.

Thirst is the greatest source of suffering after an operation, and in the management of this symptom many mistakes are made. A few years ago nurses were taught that patients should not have water after abdominal operations, and they gradually extended that prohibition to all who had recently taken an anesthetic. Unfortunately for suffering humanity, this teaching still prevails in many hospitals. This is a piece of barbarism equal to that of our forefathers, who allowed their typhoid fever patients to die from thirst. My patients all get water after an operation, and they convalesce much more comfortably than those who are deprived of it. Even after stomach operations, with our modern technic, patients suffer so little from vomiting that water can be given in moderate quantities by the mouth from the very first, so that, with the aid of salt water enemata, they need not suffer from thirst. Patients are deprived of water on the theory that the water causes vomiting. A certain percentage of patients will vomit after an anesthetic, no matter what anesthetic is used or by whom administered, and depriving them of water will not prevent it and does add to their suffering. I once had occasion to take an anesthetic myself and naturally had a raging thirst soon after. Following a heated controversy with my nurse I drank a glass of beer. I must admit that it tasted better going down than coming up, but it did me good both ways, for it took the edge off my thirst and washed out my stomach, which stopped my vomiting. A full glass of water given to a patient will frequently stop his vomiting by a process

of natural lavage, and with much less discomfort than would be caused by passing a stomach-tube. In a case of persistent vomiting nothing is so efficient as lavage, but it is always trying and a disagreeable ordeal for both patient and attendant. Any vomiting that might be caused by a drink of water will do no harm, for with our modern hemostasis and wound-closing we need have no fear of secondary hemorrhage or the wound opening. The only possible objection is that the act of vomiting causes pain, but if left to the patient he will choose the water every time, for the water is grateful to him, and it is much less painful to vomit when there is water in the stomach than when it is empty.

All surgeons agree that the patient is better without food for a time after an operation, for he does not suffer from hunger, and an effort to force feeding would surely disturb his stomach. Definite rules as to the time of feeding and the character of the food cannot be satisfactorily formulated. The patient's appetite and taste are the best criteria. He does not crave substantial food at first, but as soon as he does crave it he should have it. Many a patient has gotten out of bed wabbly on his legs, at a time when he should have been strong, simply because he has been fed on slops. One who had not undergone an operation would wabble under like conditions.

Aside from opiates and mild cathartics, medicine has very little place in post-operative treatment. My patients get it only to meet definite indications.

Pain is the one symptom common to all patients after an operation, and demands our constant consideration. As already suggested, much can be done in the way of prevention, but after that our sheet-anchor is opium, in some of its various forms. Morphia administered hypodermically is the universal favorite. Codeia and other milder preparations are dis-

appointing and should be used only where the patient is known to have a marked idiosyncrasy against morphia. When morphia is indicated, it should be given in full doses, usually one-fourth of a grain, because a smaller does does not have the desired effect and is just as liable to be followed by unpleasant effects as a larger one. It is our mission on earth to relieve pain, and in post-operative treatment we have a great opportunity. One who denies his patients an opiate after an operation, on theoretical grounds, is in error and would very quickly change his views, were he the patient. At one time I, in common with most surgeons, denied my patients opiates after abdominal operations, on the theory that they caused gas and consequently greater suffering. My patients differed with me at the time and censured me afterward, and after long experience I am thoroughly convinced that they were right. All patients have some discomfort from gas after the abdomen has been opened, but my patients have infinitely less suffering now than they did when I denied them this boon. Some able surgeons of large experience are now giving as a routine a hypodermic of morphia to these patients before they recover from the anesthetic, and while I have not yet adopted the routine, I am inclined to believe that this will eventually be the accepted practice. As long as the hypodermic syringe is kept in the hands of the nurse, and its use discontinued when the surgeon decides that it is no longer needed, any fears of establishing a habit are only theoretical. Post-anesthetic vomiting is not a contra-indication for the hypodermic, but, on the contrary, it is often helpful in this condition.

The proper care of the bowels after an operation has much to do with the patient's comfort. In other than abdominal cases, the patient will feel better after a bowel movement on the second day, which can be

secured by a glycerine enema or a wine-glass of Pluto water. In abdominal cases where the intestines have not been involved in the operation, the same rule applies, but when the bowel has been operated upon, it is well to wait until the third or fourth day, for fear of injury at the seat of the operation. In one of my cases an over-zealous orderly administered a high enema on the day after an operation for suppurative appendicitis, with the result that part of the enema came out through the wound. When the patient is distended with gas, a Nobles enema should be given, and repeated if necessary. There should be no exceptions to this rule, because the danger from distention with gas is greater in any case than it would be from an enema, and this enema is the best known means of causing the expulsion of gas.

In the care of the bladder, the catheter should be used only as a last resort, and then with the utmost care. Hot applications and change of position, even to getting out of bed, will usually enable the patient to empty his bladder voluntarily.

In every case the question naturally arises, when shall the patient get out of bed? All agree that old people should get up at the very earliest period possible, for reasons well understood, but there is still a great diversity of opinion as to when a younger patient should get up. A few years ago we kept patients in bed longer than we do now, but we found that, instead of shortening convalescence, it lengthened it. The tendency now is for the pendulum to swing too far the other way, for many patients have had their convalescence unduly prolonged through efforts to get them out of bed too soon. It is not well to establish fixed rules in this matter. It is far better to allow each patient to be a law unto himself. With foolish patients, the surgeon must be arbitrary and settle the question in accordance with his judgment,

but sensible patients can often be consulted in this matter to advantage. The average patient may be allowed to get up as soon as he can do so comfortably.

Every abdominal operation is of sufficient importance to justify the patient in remaining in bed for from one to three weeks, owing to circumstances, and he is usually content to do so. There is no crying need for getting a patient out of bed the day after an abdominal operation. He is safer and more comfortable in bed for a few days at least. I recently operated upon a colleague for chronic appendicitis, who made the statement that he intended to get out of bed the day after the operation; that staying in bed for a week after such a simple operation was all nonsense, to all of which I readily acceded, with a mental reservation. On the first day he quietly curled up on his side, and I smiled without comment. On the second day he was still in bed, and when I asked him why he was not up, he mildly suggested that I go to a warmer climate, and very emphatically stated that his viewpoint had changed.

DISCUSSION

DR. CHAS. E. BOWERS (Wichita): The paper to which we have just listened is interesting and should receive a free discussion. There is something that appears to me to be more important than simply the management of our cases before and after operation. It has been my practice to prepare a patient in a short time after he enters the hospital and to operate as soon after as I can. A long stay in the hospital of a patient who has had little experience with hospitals tends to a development of a nervous state, and the sooner we can do our surgical work after the patient enters the hospital the better it is for both patient and surgeon. After the patient is ready the surgeon should be fully prepared and ready with his assistants so that there shall be no delay. Delay and the presence of friends of the patient in the operating-room disturb the comfort of the patient and cause him to become nervous, and we find there is difficulty in the administration of the anesthetic and the patient often suffers therefrom.

The surgeon should be an individual who is pronounced in

his character and in his diagnosis, and he should be prepared to enter quickly upon his work. There should be no delay, and if his diagnosis is to be made positive after he begins his exploratory operation, let him readily come to a conclusion, do his work definitely, retire with neatness and despatch, and not prolong the anesthetic. If the patient is removed from the operating-room to the convalescent ward, he should be put under the care of someone who is capable of knowing the conditions, and, above all things, he should not be deprived of water.

Three years ago I underwent five operations in six months, and after the first operation I was deprived of water or of anything to drink, and the suffering and discomfort I endured I shall never forget. The next time I asserted myself and superintended my subsequent care and took water, and upon the last occasion I took a glass of beer soon after the operation, and the water and tea I took did me lots of good in that they relieved me of a distressing thirst.

Dr. Jabez N. Jackson (Kansas City): I believe we all recognize the fact that the constant lowering of the mortality-rate in the hands of experienced surgeons is dependent more on attention to some of the details in connection with the preparation of patients for operation and their after-care than on any other one thing.

Dr. Moore's paper is excellent, and I concur in everything he has said with one exception, and I make these remarks because I believe that, after all, our wisdom comes from contributed ideas, whether they agree or disagree.

I disagree with Dr. Moore in his position relative to getting patients up early after operation. I must confess that I am becoming an enthusiast in the conviction of the superiority of results obtained, both primarily and ultimately, by allowing patients to get out of bed relatively early after operations. This is not an idea that has come to me as a sort of cranky notion or prejudice. I remember some years ago, when Dr. Robert T. Morris first used the expression in speaking of appendicitis, "An inch and a half incision and a week and a half in bed," I, with many others, thought the man had gone crazy over the idea of doing an operation through such a small incision and getting a patient out of bed in such a short time. However, at about that time, I first learned how to use adhesive plaster in sprained ankles, and how I could, immediately after application of this dressing, turn patients out and permit them to walk on their feet even after severe injuries to those parts. I soon observed, to my delight, that pa-

tients treated in that way made a much more rapid convalescence and suffered much less, and the ultimate result, so far as the condition of the ankle was concerned, was much better. I came to realize that if this line of argument was true as to the repair of an injury of this nature, possibly the same logic or physiology might be applied to other conditions of traumatism after surgical operations. When traumatism occurs, what do we observe? In the first place, we have a certain amount of exudation of material that is thrown out for the processes of repair, and we know that if this material remains for a long time after accomplishing its purpose it is converted into fibrous tissue, and we have an excess of scar-tissue. We know furthermore that the lymphatic circulation and also the venous circulation are materially dependent upon the action of muscles and the motion of the joints, on account of the lack of a definite force behind, which the heart affords to the arterial circulation. Hence we may truly say that a complete physiologic circulation is very largely dependent upon the preservation of physiologic muscular exercise. Hence it is that, when a sprained ankle is put in a plaster cast and kept there for three or four weeks without any movement whatsoever, we find, after the cast has been taken off, that the ankle is generally swollen and stiff, the same as it was when the cast was put on. The excess of exudates has interfered with proper repair and will result in probably permanent disability of the ankle. We believe a like analogy to exist in the treatment of any traumatism from which a patient may suffer.

At first, I was not willing to make a radical change in the treatment of abdominal wounds and get the patients up within a few days after operations, for I had up to that time kept simple cases of abdominal section in bed at least a month. We began therefore by shortening the time to three weeks and a half, then to three weeks, and still later to two and a half weeks, and so down, finding that with each successive step in the curtailment of confinement in bed the patients, instead of suffering disastrous results, continuously improved. I must confess I cannot see any particular reason why a man who has had his appendix removed in the interval, a clean case with no necessity for drainage, should be kept in bed three weeks. It is rare therefore that for any abdominal section we keep a patient in bed over a week, unless it is a drainage case, and more get about even earlier than later.

Dr. Moore alludes to the fact that frequently patients do not want to get up shortly after an operation and that it is

well to consult the feelings of the patient. In this connection, we have a good illustration in football players. I used to be a football crank and have many times watched the formation of the boys. A boy goes out to play football and puts in a strenuous afternoon, goes home, and the next morning he is sore all over. If he consulted his personal feelings, he would not play again for another week, and if he did so he would then be as sore after play as he was the first time. What does he do? He goes out the next day and plays, and works that soreness of the muscles out, and when he gets through he is not as sore and stiff as when he began. The next day he may have a slight amount of soreness, but he continues to exercise, and at the end of the third day he probably feels all right, and after that he exercises without feeling any discomfort or soreness. This continuous exercise produces a physiological circulation, which is of value to him. And so it is with regard to getting patients out of bed early after operations. If you let a man get up early after an operation, very likely he will say to you, "Doctor, I feel sore." I tell such a man to stay up a little while until he gets tired, then to rest again. When he gets up the next day, the chances are he will say, "I do not feel so sore," and probably by the third day all discomforts have disappeared, and then the patient assumes more nearly his physiological equilibrium, and he will make a more perfect convalescence than if you should keep him in bed three or four weeks.

It has been stated by some surgeons that getting patients out of bed prematurely would be accompanied by disturbances in wound-healing, the retention of secretions in the wound, secondary abscesses, and infections, but that has not been my experience. I find there is less secondary trouble from getting patients out of bed early than there is where they are kept in bed three or four weeks, as was formerly the custom. I have patients walk out of the hospital at the end of from five days to a week after an ordinary appendectomy, without a symptom of pain or of any disturbance, and with a perfect feeling of well-being.

Dr. W. W. Grant (Denver): There is one post-operative feature of our work, especially that of an abdominal character, which I would like to have someone explain, and that is, what is it that makes these patients suffer so much from backache after an operation? I have heard the construction of the operating-table discussed until there seems to be little more to be said on that subject; but I find patients complain,

nevertheless, intensely of backache after an operation, whether from fifteen minutes or an hour.

I do not share the views of my professional friends who insist that a patient after an abdominal operation is better for getting up inside of a week. I know that it takes a certain kind of tissue a certain length of time to repair, and no abdominal fascia will be repaired well at the end of a week. I find no disadvantage in keeping these patients in bed, after a long incision through the abdomen, two weeks. These patients can get a good deal of massage and exercise in bed, and the wise surgeon will permit his patient to assume, in a clean case, any position desired and to get any natural exercise without getting up too early. While the abdominal walls will stand a certain amount of strain after severe operations, yet I believe damage may be done by permitting patients to get out of bed within a week after hernia and many other abdominal operations.

There is no logic in the position taken that sepsis is more likely to occur in patients who are kept in bed two weeks than in those who are permitted to get up after operation, in a week or less. If there is no sepsis in three to five days, there will not be any two or three weeks later. The element of time, after five days, ordinarily cuts no figure as to sepsis, and therefore the position of Dr. Jackson is not well taken.

Dr. F. A. Dunsmoor (Minneapolis): I am very glad that my colleague has written this paper, because it sounds like common sense. Good sense is the most uncommon sense in the world, but this paper contains a lot of good sense. First, his suggestion that we do not purge patients, is a valuable one. The thought of a short time in a hospital has in it a little hypnotism or suggestion of what every patient looks for—absolute recovery. It inspires confidence to make use of that amount of suggestion.

The next point is with reference to the use of the operating-table, and the last speaker has asked a question which appeals to me and which I believe has been satisfactorily answered by Dr. Goldthwait, of Boston, by saying that a great many of the backaches from which these patients suffer are due to the strain upon the ligaments which go between certain portions of the spinal column, and that while the patient is asleep or is under the influence of the anesthetic the back sags down flat and puts upon a strain the ligaments which are unaccustomed to such a position. If, while a patient is upon the operating-table, a pillow or support of any sort is used to keep the spinal column in its ordinary position,

the patient will escape backache. Since reading the suggestion offered by Dr. Goldthwait I have put it into practical use, and it has had a beneficial effect on post-operative pain and discomfort.

With reference to vomiting: Of course we want the patient's stomach empty before he undergoes an operation. There is a mechanical effect from the administration of the drug (anesthetic) and from the accumulation of mucus within the stomach during the time of the operation. I believe in allowing the patient to drink a large amount of fluid immediately after operation. I allow two Sedlitz powders to be taken separately each in a full glass of water, thus making a slow effervescence in the stomach, due to the liberal quantity of water.

As regards allowing patients to get up early after operations: My attention was first called to this after operating on a barber a short time ago for acute suppurative appendicitis. I operated on him on a Saturday, and each day thereafter he not only walked out to the water-closet to urinate but to move his bowels. Two or three days later when I inquired about him, I was informed that he had walked out of the hospital and gone home, and a week from the time of the operation he resumed his business.

As to the influence of opiates: I agree with Dr. Moore. I think the dose should be sufficient to control pain. We ought to be as generous to our patients as we are to ourselves.

I believe convalescence is shortened by allowing freedom. Even if the patient does not sit up or walk, it is an invariable rule with me to allow the patient to assume any position he likes after operation. If the abdominal structures have been closed, layer by layer, there is no likelihood of disturbance by movement.

A four ounce saturated solution of magnesia-sulph. enema is a good thing to use in these cases, and should be repeated every six hours until the patient gets a good bowel evacuation. That will leave the stomach at rest for the use of such fluids as are agreeable to the patient.

One of the speakers told of taking beer after he was operated on. I do not hesitate to allow patients who are beer-drinkers a glass or two of beer after operation. They could have a stein or more if they wish. Those who, on account of religious principles or scruples, are opposed to drinking beer, I allow water or ginger ale. A great many patients

want pop on account of the flavoring which they prefer, and I do not hesitate to allow them to have it.

Dr. George C. Barton (Minneapolis): After having read a paper on the subject of getting up early after operations by a New York man (Dr. Boldt), I attempted to try the effect of allowing my patients in the Minneapolis City Hospital to get up soon after operation. It did not make any difference what the operation was, I allowed the patient to get up as soon as she would, and the majority of them got up on the third or fourth day. I remember one patient from whom I had removed the appendix and pus tubes. She met me at the elevator on the morning of the fourth day after she went to the hospital. The nurses and the internes were very much surprised by the way that these patients got along, for the reason that they remained in the hospital a less length of time than formerly and seemed to do much better. The only cases in which I think the results were not so good, were cases in which I had operated for displacement of the uterus, one case particularly in which I did a Gilliam operation along with some other operative procedure. While this patient got up and moved around and seemed perfectly well when she left the hospital, she had some pain afterward and symptoms which may have been due to getting up too early. I have not been so thoroughly convinced of its benefit as to try it in my private cases, although the results have been very good.

Dr. Charles H. Mayo (Rochester): Dr. Moore's paper certainly shows a marked contrast as regards simplicity to the papers that were written a few years ago on this subject, where the amount of detail to be carried out in the antiseptic preparation of nurses, etc., required so much help that there were many chances for failure in its completeness. I am reminded of how many of the operations formerly considered life-saving procedures we have gradually abandoned. Dr. Ochsner tells us a story to this effect, that while visiting clinics in Paris where they were using circulating warm water in the operating-table, at the close of the operation the surgeon spoke of how well the patient had stood the operation—no shock whatever, due largely to the warm water circulating under the table, but in investigating to see how it worked, he put his hand on the table and found that the orderly had accidentally connected the cold water tap. (Laughter.)

There are two things in the preparation of patients which influence their condition very materially, namely, the patient

was made sick if the operator delayed a few days between the time of his examination and the time of the operation, because if the patient ate unaccustomed food and drink he was not able to stand the operation as well as he would have done at home under ordinary circumstances and surroundings.

I think death occurs sometimes from lack and neglect of proper preparation, and I wish to mention one or two points in this connection.

Take an old man with an enlarged prostate, who is thin and feeble, and for months has been living with as little fluid as he can take, his circulation is down at the lowest possible ebb. Such a patient should, for at least ten days, be put on some type of mineral water and should be instructed to drink two or three times as much as he has been drinking, in order to get his circulation full. You operate on that patient with such a preparation on the fourth day, and if you feel of his pulse you will say it is foolish to operate on this man with an atheroma like that. He has lost blood. He has not taken much fluid. He has been making urine, and there is some depletion of his serum. On the fourth day this man is quite sick. If he could have received fluids beforehand the little extra loss to the circulation would not have been of importance if he had been filled with fluid one or two weeks before operation.

In operating on cancer of the large bowel, if a physic could be given two days before operation so as to let the patient recover and get thickening of the fecal matter before operation is undertaken, it would be a good thing.

With reference to getting these patients up after operation: That depends on how sick the individual is. We can all talk about getting patients up very early, but we all know that some have gone to the extreme in this matter, and those with private hospitals to support go to the other extreme sometimes. I believe there is a middle ground to take in reference to this matter, and that it is necessary for us to use judgment.

Phlebitis comes on at times from keeping patients too long in bed. It may occur in two per cent of the cases of abdominal operations.

As to the percentage of cases in which pulmonary embolism occurs following operations: In some clinics it is about one in six hundred abdominal cases; in other clinics it may be one in fifteen hundred. Death not infrequently occurs in a case in which it was not expected, and not necessarily in an infected case, but in a case in which there was a clean

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wound, and I believe in certain cases, if there is not much sickness, if we can get the patients up early, all right. If we cannot get them up, we should see to it that they move their muscles or limbs, and keep up certain movements of the muscles, even though they must retain the recumbent position, to prevent stasis of circulation.

As to giving patients water after operations: There are patients to whom we should not give much water. A few sips of water will relieve thirst. Hot water is good for the relief of thirst if a patient feels dry about the mouth. We talk about giving water. It is often not taken up. It must traverse the stomach; it must traverse the entire circuit of the small intestines before it is taken up, so that it is easier to give water by the rectum, because it must be absorbed in the cecum by that part of the colon and part of the transverse colon.

Another comparatively frequent cause of trouble and even death after operation is acute dilatation of the stomach from the retention of large quantities of fluid, and you will be surprised to know that from the stomachs of some of these patients who do not vomit large amounts of fluid may be withdrawn and should be looked for in certain abdominal cases.

Dr. Willard Bartlett (St. Louis): I recall a semi-amusing incident which occurred at the hospital several years ago and which calls attention to one point Dr. Moore has rightly urged, namely, the desirability of giving many patients water as soon as they want it. A patient in the old days, when anesthetics were given thoroughly concentrated, was exceedingly nervous, and a few hours after operation he vomited considerably, as most patients did at that time, and begged for water. He was told he could not have water for twenty-four hours. Some of his friends sent him a nice little plant and flower-pot, which was placed at his bedside, and which was well watered by the nurse. While the nurse left the room he took up the flower-pot and drank the water. That patient did not vomit after that, and he told me afterward that he thought the water he drank had something to do with it. Since that time we have given more water than we did before.

Dr. A. E. Hertzler (Kansas City): Wound-healing is not a biological process primarily, as was formerly considered, but a chemical one. The basis for fibrous tissue is identical with that of the formation of fibrin in blood-coagulation, and it has been demonstrated that a wound is as strong to-day as

it will be in six or eight days. The biological process is not complete in a week. The cell undergoes changes, but the fibers are there soon afterwards.

DR. MOORE (closing the discussion): My principal object in presenting this paper was to give my experience, and so far as the use of water and morphia is concerned after operations, I am pleased to know that we are nearly unanimous in that matter. I know that all operators do not agree with this, but I am gratified to know that so many members of this Association do.

With reference to the remarks made by Dr. Jackson about getting patients up early after operation: I am open to conviction, and I hope I shall die before I get to the point where I am not. I believe in the dictum of Emerson, who said that a man who never changes his mind probably has no mind to change.

I was somewhat dogmatic in my statements with reference to the time in getting patients up after operation. There is really no crying need for getting a patient out of bed immediately after operation, and I still feel that way, but I am open to conviction, and when others can demonstrate to me that patients do better by being allowed to get up the next day or so after operation, then I may conform to that plan. But what about the patient who does not want to get out of bed and does not have to play football the next day? (Laughter.)

Dr. Grant mentioned backache. We often display a large amount of ignorance when we talk about it. I do not know but the greatest eye-opener I have had for years is the suggestion of Dr. Goldthwait, of Boston, as mentioned by Dr. Dunsmoor. He attributes most of the distress to the strain and condition of lying there. I do not believe Dr. Mayo's criticism refutes that argument at all.

A member: Do you think the elimination of chloroform by the kidneys has anything to do with the backache?

DR. MOORE: I do not know, Doctor. My patients who have had backache usually have it lower down than the kidneys. It has been here (indicating) because the lordosis has been allowed to sag, and to strain the ligaments and muscles during the prolonged stay in bed. I believe the slowest operators, who keep patients on the table the longest, are the ones who frequently hear complaints from their patients of backache afterwards.

Dr. Dunsmoor speaks of suggestion. We are all hypnotists to a greater or less degree. The man who is born with the

power to persuade others, to get them to do as he wishes, without realizing it, is a born surgeon. Those of us who have the greatest ability in that direction are the most successful regardless of our real merits sometimes.

I am glad my opinion with reference to opiates and water was endorsed by Dr. Dunsmoor, and he offers a suggestion which I did not mention in my paper, but which I carry out, and that is, to allow patients to assume any position they wish that may prove comfortable to them.

Dr. Barton gave us his experience in getting his hospital patients up early, but he has not carried it out with his private patients.

Dr. Mayo mentioned the old man with enlarged prostate and referred to the lack of preliminary preparation. That, of course, comes under the exceptions I mentioned. The same holds good with reference to cancer of the bowl. There is usually insufficient preparation before the operation is undertaken. Dr. Mayo strikes the keynote when he says he believes there is a middle ground that we are bound to reach in the matter of getting patients up early after operations. Some experimental work needs to be done in this direction, so that these patients must not be allowed to get up too soon or to remain in bed too long after operation. It is so essential for us to know what the medium is.

Dr. Mayo makes the point that the water is not absorbed by the stomach; that it is not taken up until it reaches the large intestine. Possibly Dr. Mayo can demonstrate that, but I doubt it.

Dr. Bartlett's experience of a patient taking water by stealth is quite common, as patients will get water if they can. A little suggestion sometimes is a necessary part of the post-operative treatment. The prone position is not only very helpful at times, but absolutely necessary to save the lives of certain patients.

PRIMARY SARCOMA OF THE LIVER

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The history of the word *sarcoma* is very obscure. For many years growths of the most varied anatomical characteristics were all classified as "fleshy tumors." Celsus, under the names *myrmecia* and *steatoma,* describes growths bearing the clinical characteristics of the sarcomata. Under the name *steatoma* Galen describes various bulky polypi.

Confusion in nomenclature, with no serious effort at its correction, prevailed during many years until early in the 18th century when we find surgeons attempting a classification of tumors. Saviard, in 1702, Heister, in 1750, and Boerhave, in 1751, described fibrous tumors of the uterus and osteosarcomata as sarcomata, but made no definite distinction between a sarcoma and a steatoma. Other efforts at classification were made by different surgeons during the later years of the century, but it remained for John Abernathy, in 1809, to introduce the generic term *sarcoma* in the classification of tumors.

To-day we recognize as a sarcoma a malignant tumor belonging to the connective-tissue group and consisting either of pure embryonic tissue or of embryonic tissue undergoing its first modifications in becoming adult tissue. While a discussion of the general characteristics of sarcomata would be of interest, it cannot be undertaken at this time, and no effort will be made

to consider this phase of the subject, except as it bears directly upon sarcoma of the liver.

Primary sarcoma of the liver is a rare disease, and an exhaustive search of the literature reveals but a few cases as compared to carcinoma and other neoplasms affecting this viscus. In fact, the scarcity of literature upon this subject is most marked and has rendered the search for data, which might be of profit and interest in this connection, most tedious and difficult. Few of the modern text-books mention the subject at all, and when mentioned it is usually simply to state that it is very infrequently observed. Rolleston, in his work upon "Diseases of the Liver," presents many interesting facts bearing upon this disorder, and I wish to acknowledge the great assistance rendered thereby in the preparation of this article.

In 1901 Vecchi and Guerrini, after a critical examination of the 45 cases reported as primary sarcoma of the liver, accepted only 21 cases as undoubted examples of this condition. Rolleston states that he has notes of 64 cases of "reputed" primary sarcoma of the liver, but he fails to mention how many of these he considers authentic.

I have been able to collect from the literature 59 cases of this disease to which I wish to add 14 reported in personal letters received in response to letters of inquiry sent to thirty of the leading surgeons of the United States, and one of my own, making a total to date of 74 cases of undoubted primary sarcoma of the liver.

It is only proper to state at this time that many cases reported as primary sarcoma have been rejected, and that some few cases reported as carcinoma many years ago, when the line of demarcation between carcinoma and sarcoma was not very sharply drawn, but which careful analysis proves beyond a doubt to have been sarcomata, have been included in this list.

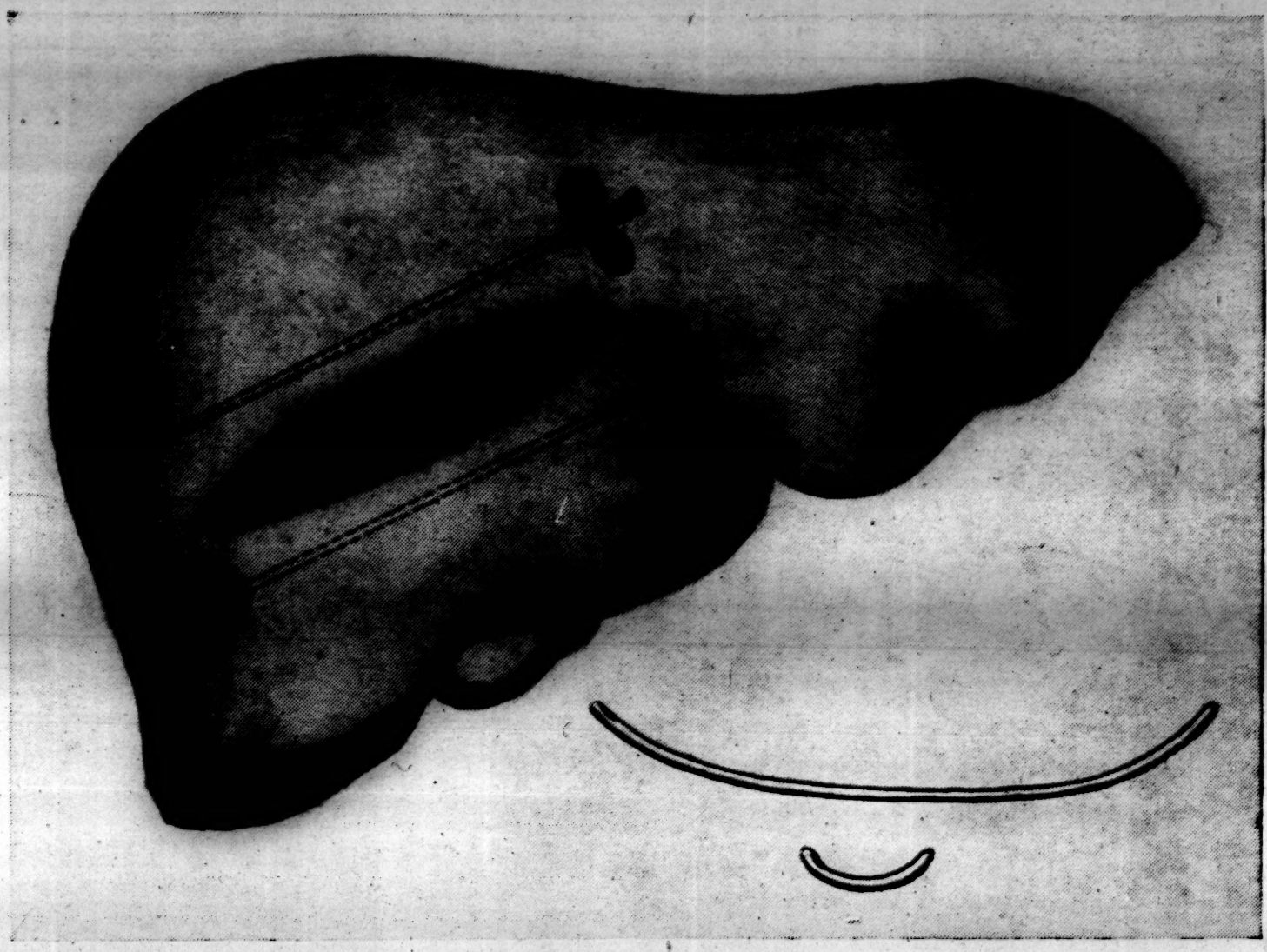

Fig. 1.

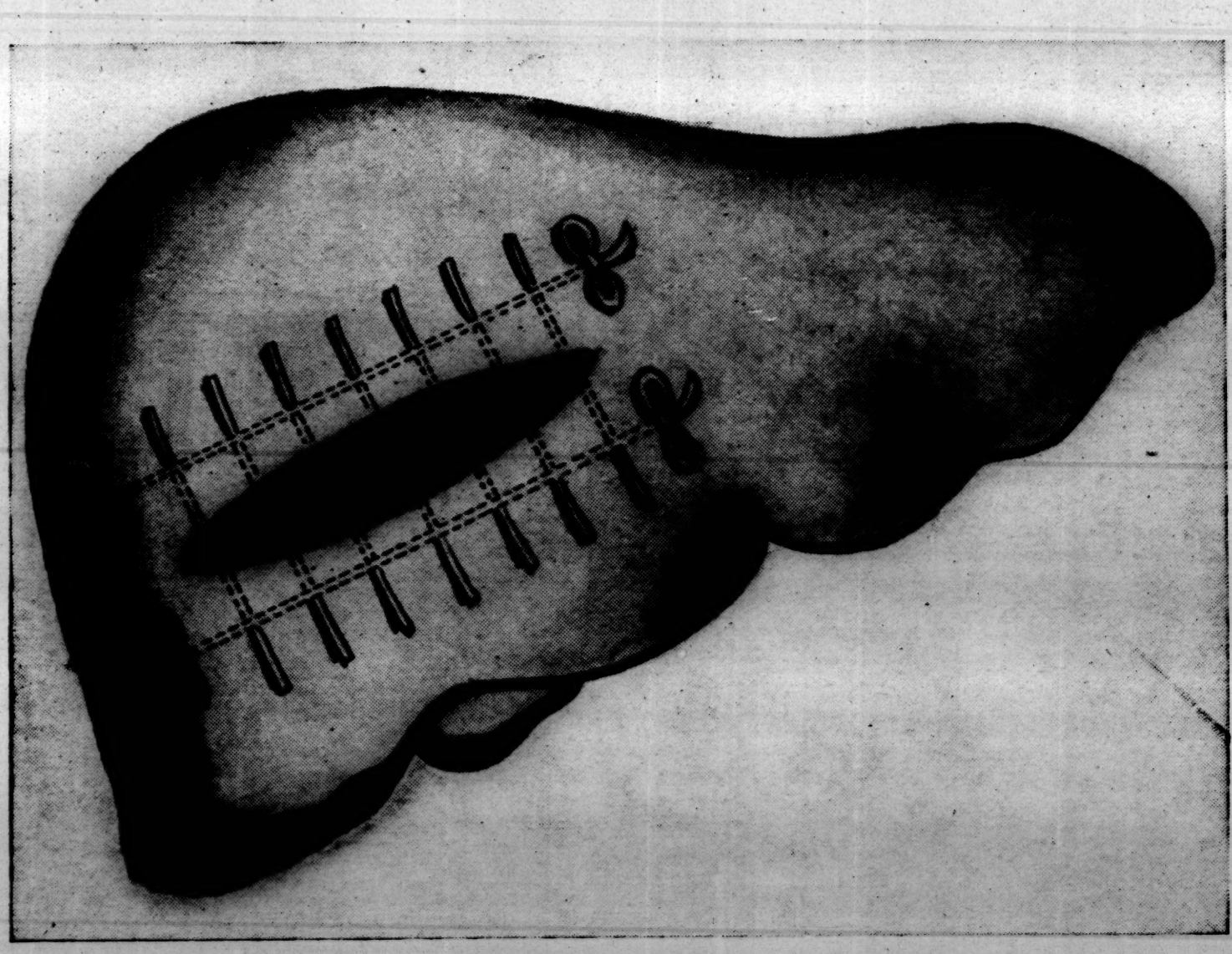

Fig. 2.

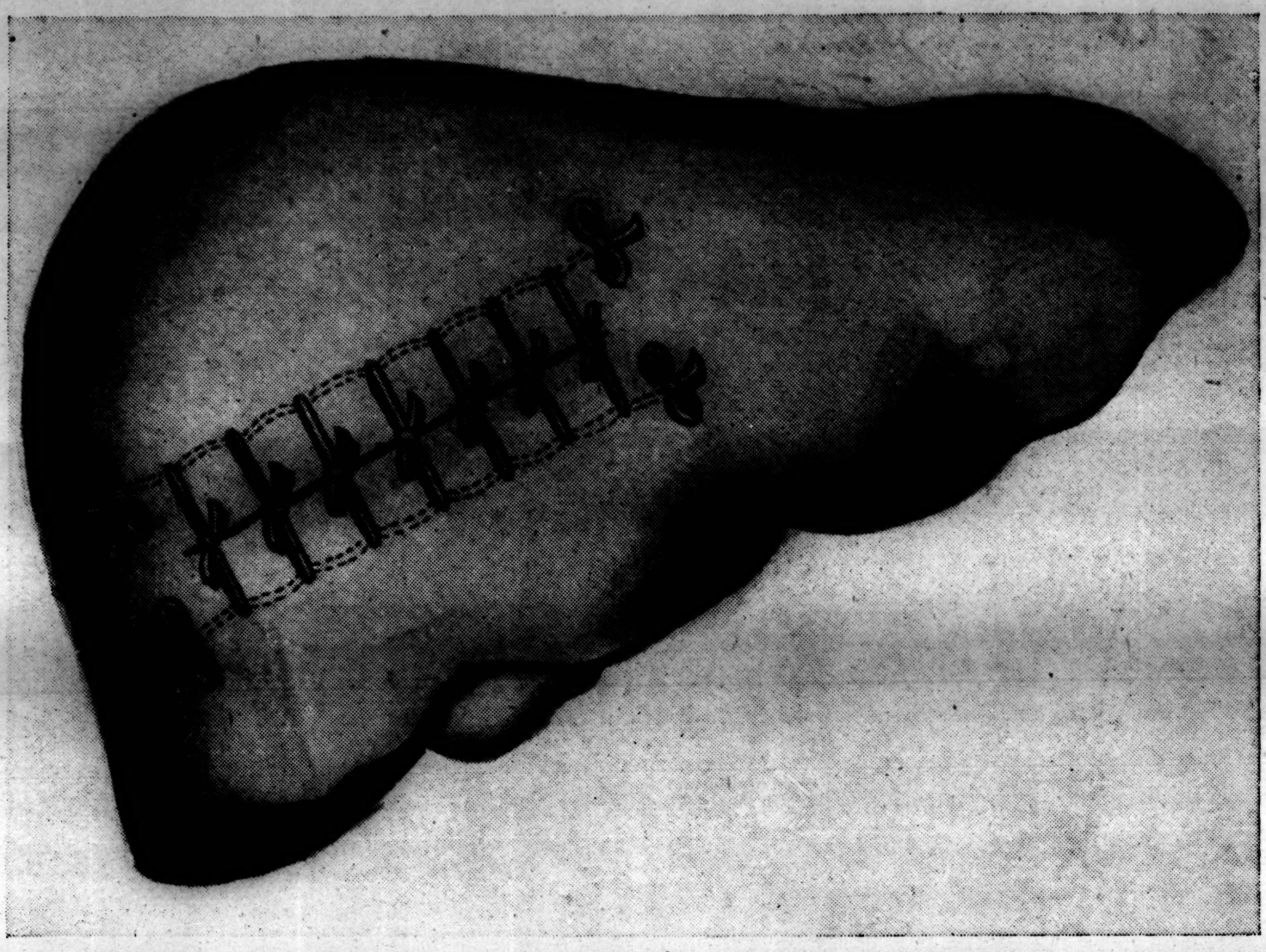

Fig. 3.

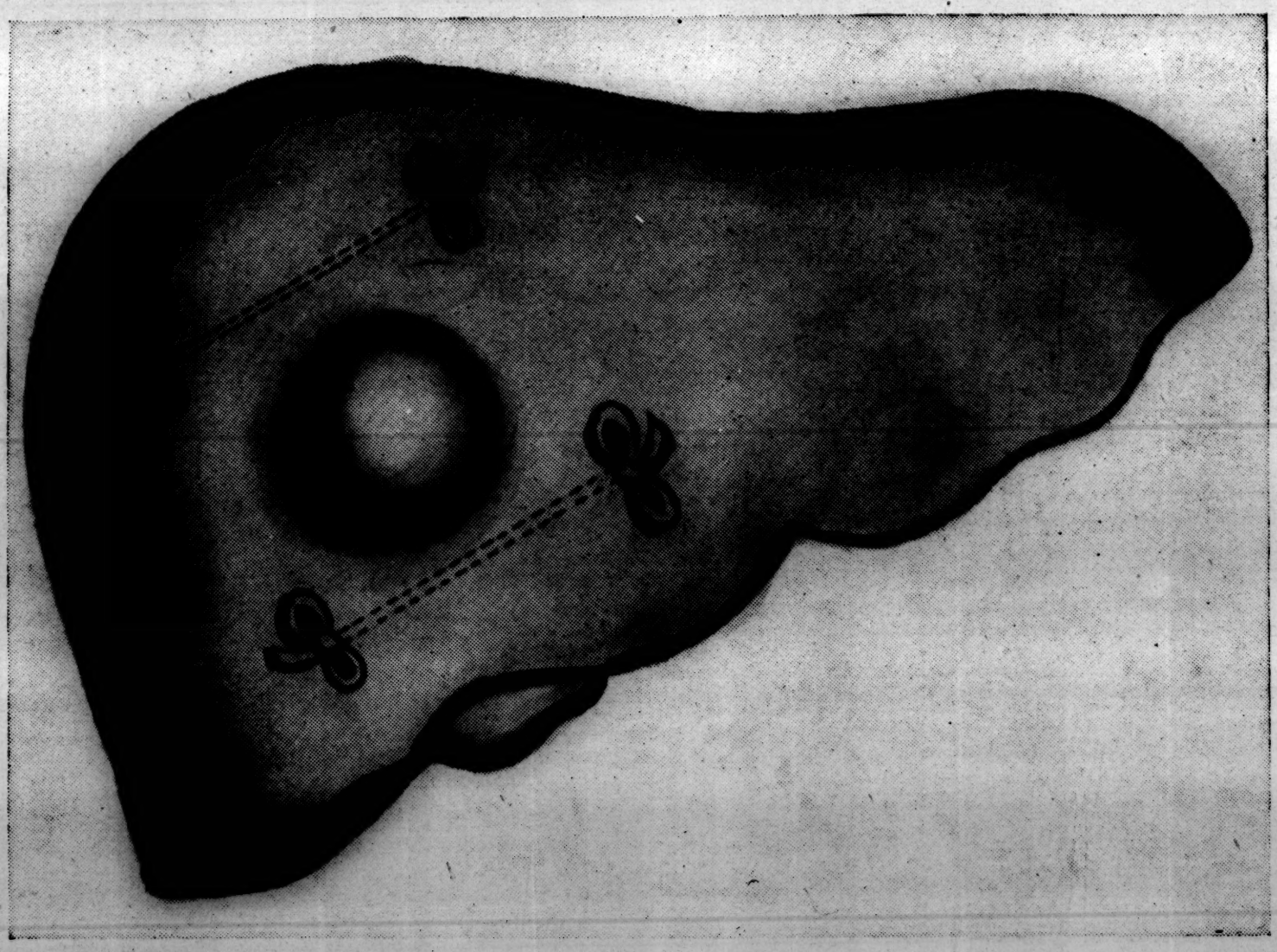

Fig. 4.

SEX

Primary sarcoma of the liver seems to occur somewhat more frequently in males than in females, as in the seventy-four cases above mentioned, twenty-nine were males, twenty-one females, and in twenty-two the sex was not stated.

AGE

Primary sarcoma of the liver may occur at any age. Two congenital cases have been reported and the others at all ages up to 74 years, which is the oldest case recorded. In the list of cases accompanying this report are to be found 17 under 5 years of age and 17 over 40 years of age. The average age for all reported cases occurring in patients over fifteen was 43.3 years as compared with 47.5 in Rolleston's table. In many of the reported cases the age of the patient was not stated.

CLASSIFICATION

Rolleston classifies primary sarcomata of the liver as follows:

1. *Primary Massive Sarcoma.*—There is a large tumor, usually in the right lobe, similar to the massive form of the primary carcinoma, in some cases projecting from under the surface of the liver so as to become pedunculated. Small secondary tumors may be found throughout the liver. The cells may be small, round, spindle-shaped, or of various shapes and sizes. Hemorrhage frequently takes place in the growth, causing it to assume a mottled appearance. Large sarcomatous tumors, following hemorrhage, may break down into cystic cavities resembling abscesses. About one-third of all reported cases of primary sarcoma belong to this group.

2. *Nodular or Multiple Primary Sarcoma.*—There are a number of nodules scattered throughout the liver-substance which, when small and numerous, tend to

become confluent. As in the previous class, the cells may be of various types. This is said to be the most frequent form of the disease.

3. *Diffuse or Infiltrating Primary Sarcoma.*—Both lobes of the liver may be infiltrated in this variety. This form is most frequently seen in infants, and at times care is required to differentiate it from the lesions of the congenital syphilis. It is characterized by large, endothelial cells and large quantities of hyaline fibrous tissue.

4. *Primary Sarcoma Arising in the Cirrhotic Liver.*—This form is very rare, but two cases having been reported, one by Ford and one by Vecchi and Guerrini.[3]

5. *Primary Melanotic Sarcoma of the Liver.*—The existence of this variety has often been questioned, and while some such cases have been reported, it was suspected that they were really secondary manifestations of the disease, the primary growth having been overlooked. Pitt reports a case of a large, melanotic sarcoma of the liver, supposed to be primary, as no other manifestations of the disease could be recognized during life, in which the post-mortem revealed a small growth in the right uveal tract.

DEVELOPMENT

Primary sarcoma may arise from the connective tissue of the liver in the portal spaces, and from the perivascular connective tissue, from the Kupffer's star-like cells around the capillaries and from the blood-vessels and the lymphatic endothelium. Those originating from the latter source should be classified as angiosarcomata, to which class many of the reported cases belong.

The microscopic arrangement of the sarcoma of the liver often resembles carcinoma because of the alveolar structure which is noticed in those growths of endothelial origin. This fact is responsible for much of

the confusion concerning the real nature of some of these tumors.

Small round-celled, large round-celled, spindle-celled, giant-celled, lymphosarcoma, angiosarcoma, including the endothelioma and melanotic sarcoma, have all been found occurring primarily in the liver.

Sarcoma of the liver grows in two different ways: first, by proliferation; second, by invasion. Growth by proliferation or multiplication of the tumor elements tends to repulse, compress, or isolate the surrounding tissues, so that the tumor seems to be encysted, a condition most favorable for extirpation, but, unfortunately, less frequent than the others.

Growth by invasion of the surrounding tissues corresponds to the diffuse forms of sarcoma; and is characterized by the deposit of embryoplastic elements irregularly in the vicinity of the tumor. These elements may be arranged as nodules or as an infiltration of the surrounding tissues and always faithfully reproduce the primitive type of sarcoma.

ETIOLOGY

The problem of the etiology of malignant diseases in general is yet unsettled and cannot be considered here.

The causes of sarcoma formation are very imperfectly understood. There seems to exist in some cases a certain predisposition, either individual or local, favoring the development of the sarcomata under the influence of external causes, such as blows or repeated local irritations. Unquestionable examples of the congenital sarcomata are very rare, but two such cases being recorded. Some observers claim that cirrhosis predisposes to the development of these growths but of this we have no definite proof.

PHYSICAL SIGNS

In the early stages of the disease the patient may

present few signs of serious illness other than anemia. Usually, however, emaciation is rapid and the well-understood signals of cachexia are displayed without much delay.

Sarcoma usually produces a very definite enlargement of the liver. The whole organ may be involved in the nodular growth, or the tumor may be comparatively smooth, globular, and of great size, and, in those cases marked by hemorrhage and degeneration, may simulate abscess.

Jaundice and ascites are far less common with sarcoma than with carcinoma of the liver.

The ascitic fluid, when found, is not particularly characteristic, as it has been found clear even in cases of melanotic sarcoma. Secondary anemia is always present, and edema of the legs and feet is frequently observed.

SYMPTOMATOLOGY

According to Rolleston, the most common symptom of primary sarcoma of the liver is excessive weakness, which, in the case observed by me, seemed altogether out of proportion to the general physical condition of the patient. This is probably due to the hepatic inadequacy, the result of destruction of the liver-tissue and pressure, and is marked by toxemia accompanied by loss of appetite.

Nausea and vomiting may be present, and while constipation is the rule the case observed by me had persistent diarrhea.

Pain is present in every case of primary sarcoma of the liver and is due to the increased tension and stretching of the capsule. In some cases the growths involving the liver capsule set up a perihepatitis, which still further increases the pain. The pain is constant and may be noticed in the right hypochondrium, the back, shoulder, or loins.

These symptoms usually increase steadily in severity

and are quickly supplemented by rapid loss of weight and increase in the evidence of auto-intoxication even to the point of stupor or delirium.

DIAGNOSIS

The diagnosis of tumors of the liver is very difficult. In 40 cases the correct diagnosis was made only twelve times, according to Thompson.[10]

Primary sarcoma has been known to simulate abscess. It is frequently impossible to determine the nature of the neoplasm, and in many cases the presence of the tumor is all that can be established. It is scarcely possible to differentiate sarcoma from carcinoma although the age of the patient, the rapidity of the growth, and the symptoms of greater local activity in sarcoma may assist us in making the diagnosis. Pepper[5] states that sarcoma runs a more rapid course and is less apt to be accompanied by jaundice or ascites than carcinoma.

Should the abdomen be full of ascitic fluid, a satisfactory examination of the liver cannot be made until the fluid has been removed. In cirrhosis the enlargement is more uniform, but the principal point in differentiation is the much greater rapidity of the process in sarcoma.

Gummata may simulate sarcoma of the liver. If the patient's condition will warrant the delay, vigorous antisyphilitic treatment may be instituted and the matter thus cleared up. The differential diagnosis between primary sarcoma of the liver and hepatic abscess, while at times difficult, is not so important, as both demand operation.

The differential diagnosis of the primary and secondary malignant growths of the liver has thus been summarized by Rolleston[6]:

Primary: No sign or symptom of growth elsewhere in the body; a single tumor: very rapid growth; jaun-

dice, rare and slight; ascites, infrequent; emaciation, not so marked; course, rapid.

Secondary.—Some evidence of growth elsewhere; multiple tumors; less rapid growth; jaundice, common; ascites, common; emaciation, marked; course, not so acute.

PROGNOSIS

Hale White[7] states that primary malignant disease of the liver probably never lasts more than four months.

Without surgical intervention the prognosis is always hopeless. Several instances of apparently permanent recovery following operation have been reported. It is, however, not to be denied that the general tendency of sarcomata is to dissemination and recurrence. Recurrence may take place very rapidly. Dissemination takes place more slowly and in certain forms is rather exceptional, such as angiolithic and certain myeloid sarcomata, especially those with myeloplaxes. However, in sarcoma of the viscera, dissemination is the rule, and it is to be feared that many cases will not prove amenable to treatment.

The medical treatment of primary sarcoma of the liver is palliative and need not be further considered.

Single primary sarcomata of the liver, when well localized, and not too far advanced, should be removed by operation, and these operations should be undertaken early, as the progress of the disease is most rapid. Delay in such cases in the efforts to make an exact diagnosis will usually result in the operative disclosure of the hopeless condition of affairs, which might have been avoided by an earlier operation, even though it was admittedly exploratory.

I have been able to secure reports of 28 cases of primary sarcoma of the liver which have been operated upon. In 9 of these cases the operation was merely exploratory, and no effort was made to remove the

tumor, as it was clearly inoperable. This leaves 19 cases where a radical extirpation of the tumor was made with 10 immediate recoveries and 9 deaths. One of these deaths occurred in an infant of four months, and the other in a child of eighteen months. One had no recurrence at seven months, and another was well at two years; another had no recurrence and was working every day nineteen months after the operation, and is still well and is daily improving in health and strength. The subsequent course of 3 of these patients was not given.

While these results following operation are not particularly flattering or brilliant, they are better than those following the non-surgical treatment of this condition, which is attended by a mortality of 100 per cent, and it is fair to assume that the recent advances in liver surgery, particularly in operations undertaken for the extirpation of liver tumors, will greatly improve the results of similar operations undertaken in the future. H. Lilienthal (personal communication) suggests the use of Coley's antitoxin in these cases.

L. L. McArthur, in a personal communication, suggests the treatment of primary sarcoma of the liver by direct exposure to the *x*-ray. John A. Wyeth (personal communication) suggests the treatment of these tumors by streptococcic infection. A. J. Ochsner, T. S. Cullen, Roswell Park, John F. Bottomley, R. Matas, and Leonard Freeman (personal communications) consider that circumscribed, solitary tumors without metastasis, should be considered amenable to surgical treatment, while W. J. Mayo (personal communication) does not think that a suitable case would probably be encountered.

Surgery of the liver has made wonderful progress during the last few years. Ahlenstiel[8] says that the operative treatment of liver tumors was given remarkable impetus by the experiments of Ponfick[9], who

showed that the liver endures such excessive inroads upon its tissue that when three-fourths of it has been extirpated it completely renews itself in a few months. Then Nasse demonstrated experimentally that when some tracts of the liver were put out of function by obstruction of the biliary ducts, these atrophied while others became hypertrophied by compensation. Remarkable operations followed these demonstrations. After Langenbeck, Lauenstein, and Tillmans had successfully removed constricted liver-lobes, Lucke and Hochenegg dared to extirpate tumors of the liver. At the twenty-second congress of the Gess. fur Chir. von Bergman exhibited a man from whom he had removed a malignant tumor and who had fully recovered with no recurrence a year later.

Terrier and Auvray[11] have written a very interesting article upon liver surgery and presented a new chain-suture devised by Auvray for the control of hemorrhage. Langenbeck[12] also published a comprehensive review of the same subject.

W. W. Keen reports three cases in which he has resected a portion of the liver with recovery in each instance, and he prefers to rely upon the cautery and ligation for control of hemorrhage.

A. H. Ferguson (personal communication), who has successfully removed a large primary sarcoma of the liver, and whose patient is alive and well nineteen months after the operation, employed matress sutures through the entire thickness of the liver tissue, inserted well beyond the confines of the tumor, and then slowly incising the liver tissue with a knife caught the vessels with mosquito forceps before severing them, and litigated them afterward with fine catgut. He stated that the hemorrhage was in this way admirably controlled.

T. S. Cullen has had a large experience in liver surgery and has secured most excellent results, having

made three resections and two repairs of laccrations of the liver with the recovery of all.

Cullen prefers to use a blunt needle very similar to that of Kousnietzoff, and controls hemorrhage by suture.

Kousnietzoff has greatly simplified the problem of liver surgery by presenting to the profession his liver-needles. These are simply curved and straight needles of suitable size without points, being rounded at the ends, and may be introduced into the liver substance without puncturing the vessels and thus avoiding hemorrhage.

Mikulicz (quoted by Cullen) said: "To my mind Kousnietzoff's needles represent the egg of Columbus in the technic of liver surgery."

To the testimony above offered in favor of these needles, I wish to add my own, as I have used them in experimental work many times and once upon the human liver with complete satisfaction.

Having unexpectedly to repair a wound in a liver tissue Cullen ingeniously substituted a Hagedorn for a Kousnietzoff needle, introducing it eye first, and found it to answer every purpose. In the same predicament, I once used a small silver probe, which was furnished with an eye and which, by the way, answered very well, as it could be easily adjusted to just the right curve.

In a former article[15] I described a new method of liver-suture which I have found very efficient in experimental liver resection in which are employed needles of the Kousnietzoff type. The method is as follows:

This suture will permit the coaptation of a liver wound, at the same time controlling the hemorrhage without the necessity for packing and will also permit the resection of large or small areas of the tissue for the radical extirpation of the liver tumor.

Parallel with the wound in the liver or with the area to be excised and about one-half inch from its edge on either side, insert deeply through the liver substance by means of a large, round, blunt needle, shown in Fig. 1, a strand of No. 3 catgut. These needles, as well as the small, blunt needles, mentioned afterwards, are modifications of the Kousnietzoff's liver-needles, which have been so successfully used and have proved satisfactory. These strands should enter the liver tissue about one inch beyond the edge of the wound, run deeply through the liver substance, and emerge the same distance from the opposite side of the wound. The ends of these catgut strands are now fastened by drawing them up snugly and tying to either end of both strands a small, ordinary skein of catgut, which, presenting a broad surface against the liver tissue, prevents the indrawing of the suture ends. Transverse, interrupted sutures (Fig. 2) of No. 3 catgut are now introduced by means of a small, blunt needle, also shown in Fig. 1, in such a manner that they engage upon either side of the wound, the long, buried strand of catgut. These may be tied as rapidly as introduced, and exerting their traction upon the buried long suture may be tied snugly (Fig. 3) ensuring hemostasis and coaptation without the danger of their cutting out.

When it is desired to remove a portion of the liver tissue, carrying with it a tumor, this may be done by excising between the buried long sutures (Fig. 4) a wedge-shaped ellipse of liver substance and introducing the transverse sutures as above described.

Hemorrhage during this procedure may be controlled either by manual pressure or by elastic ligature until the transverse sutures are tied, when it will immediately cease.

If desired, any large veins presenting along the cut surface may be tied, as recommended by Keen, by

placing a ligature about them with a small needle carrying fine catgut, which precaution in my experimental work I have found unnecessary. I have employed this suture once upon the human body during the removal of a large carcinomatous tumor from the liver and found it very satisfactory. In many experiments upon dogs I have found that it was possible to remove various amounts of liver tissue up to one-half of the organ, beyond which I have not tried to go, and also that hemorrhage from any sort of a wound, large or small, in the liver substance could be in this manner easily controlled.

As the material used in this suture is plain catgut, which, having served its purpose, will be absorbed, the necessity for an open wound, gauze-packing, etc., may in most cases be eliminated.

I do not offer this method as one that is perfect, nor do I care to make any extravagant claims for it, as my experience with it has been too limited. I offer it with the hope that, as the opportunity permits, you will try it and demonstrate its value or its shortcomings.

During the past few years many tumors of various kinds have been removed from the liver, and the subject of liver surgery bids fair to take its place in the front rank of the well-established, rational procedures.

It is this fact which offers a somewhat more cheerful prognosis for these cases of primary sarcoma of the liver, yet there are many restrictions to its employment in such cases, and the indications for and against the radical removal of these tumors should be carefully considered.

Cullen states these as follows:

"It is important to determine (1) whether the growth be malignant or not; and (2), if malignant, whether it is primary or secondary. In the case of metastatic neoplasms, as a rule, operation is contra-

indicated, inasmuch as they are usually multiple. Primary carcinoma or sarcoma of the liver is rare. Should the hepatic growth be primary, the glands along the vessels and at the base of the liver should be carefully palpated to ascertain whether they have become involved. This point was first insisted upon by Tuffier. In cases of lymph-adenoma with secondary nodules in the liver, operation is not advisable. In all cases of liver-growths the following points should be carefully considered: (a) whether the growths are single or multiple; (b) the situation; (c) the size; (d) whether they are pedunculated or not.

"If the growths are multiple and spread over a wide area, removal is difficult or impossible. On the other hand, provided that they are near the lower edge of the organ, resection is feasible. In fact, in the majority of cases, the situation is all-important.

"The size is of little importance when the growth is pedunculated and situated near the lower margin of the liver. In the case of a large tumor, however, located near the middle of the organ, removal is exceedingly difficult or impossible. If it is located near the edge, amputation is not difficult; but if it is near the middle of the lobe, a very large portion of the liver must be resected, otherwise a cavity is left which may be the source of an alarming or even uncontrolable hemorrhage. When the growth lies near the portal vein or the hepatic arteries, operation is contra-indicated, since large branches of these vessels are liable to be injured, with a resulting necrosis of correspondingly large areas of liver-substance and the death of the patient. If the growth be pedunculated, its removal is easier, inasmuch as the liver-substance forming the pedicle is much tougher than the other portions of the organ. This toughening is due to the partial atrophy of the liver-cells."

With these indications well in mind all suitable

cases of primary sarcoma of the liver should be given the chance which surgery alone affords, as extensive resections of this organ may now be made without the fear of hemorrhage, which for years was the principal factor in restraining progress in the surgery of this organ.

I desire to report the following case of primary sarcoma of the liver:

A. M., Irishman, aged 62 years, married, farmer, entered St. Joseph's hospital, August 18, 1907, where I saw him in consultation with his physician, Dr. J. L. Rantz, of Canistota, S. D.

His previous history contained nothing of interest. He says he has never been sick in his life; has always had perfect health until three months ago. His usual weight was about 300 pounds. About May, 1907, he began to suffer severely from pain in the epigastrium, which he described as constant and boring in character, and which steadily increased in intensity. His physician at this time could discover no cause for his suffering upon examination. About a month later he developed a diarrhea, which persisted through his illness, the stools often containing blood and mucus. At this time his attendant discovered the existence of a tumor about the size of a man's fist in the region of the epigastrium. Now, in addition to the pain, the patient complained of feeling weak, and this weakness increased rapidly until he could scarcely get about. A mild degree of anemia, together with some edema of the feet and ankles, also became manifest.

The tumor rapidly increased in size, the patient began to lose weight very rapidly, and the weakness and diarrhea became more and more pronounced. When I saw him, three months after he had first complained of being ill, he had lost sixty pounds in weight and presented some evidence of cachexia. He had been an extremely powerful man, of large frame, and de-

spite his great loss of weight, he still weighed about 240 pounds. He complained more bitterly of his great muscular weakness and debility than of any other symptom, and it was a marked feature of the case.

Upon physical examination the outline of the tumor could be plainly seen in the mid-epigastric region. Palpation showed it to be a large, rounded growth about the size of a fetal head, smooth in outline and but little movable. The growth felt firm, and extended from the free border of the costal cartilages to the umbilicus. The remainder of the physical examination was negative. I could not be certain either as to the nature or character of the tumor, but suspected that it might be of pancreatic origin, and I suggested an exploratory operation.

Operation, August 20, 1907. Immediately upon opening the abdomen the tumor was encountered, adherent to the anterior parietal peritoneum. These adhesions being separated, others were encountered binding it fast to the omentum, intestine, and mesentery. These were separated with much difficulty and considerable loss of blood, and it was some thirty minutes before I could sufficiently expose and mobilize the tumor to discover that it sprung from the right lobe of the liver, to which it was attached by a broad, short pedicle about three inches wide, one inch long, and one inch thick. As the patient's condition had become most alarming, I did not dare to prolong the operation by making a resection of the liver and hurriedly applied a pair of Doyen's flexible clamps with rubber tubing upon the blades, such as are used in visceral anastomosis, to the pedicle flush with the surface of the liver, and cut away the tumor. These clamps effectually controlled the hemorrhage, the rubber tubing preventing the blades from cutting through the tissue of the pedicle. Upon examination no involvement of any other organ could be discovered,

and the glands on the inferior surface of the liver were not involved.

The large cavity was stuffed loosely with iodoform gauze, and the wound partly closed. The patient required the most vigorous stimulation and was in the most critical condition for forty-eight hours, when he rallied and commenced steadily to improve. The clamps were removed at the end of forty-eight hours, and no hemorrhage followed their removal. The gauze packing was slowly removed, and the wound satisfactorily closed by granulation. The patient made a slow but steady recovery and left the hospital on September 29, 1907, in good condition. A letter received from him December 20, 1907, states that he has gained twenty pounds in weight and is feeling well with as yet no signs of recurrence.

It was a source of regret to me that the condition of the patient positively contra-indicated a resection of the liver-tissue, as the prospect of a permanent cure would have been rendered much better thereby. I was also for the same reason denied the privilege of using my own method of liver-suture described above.

No claim is made that the result in the above case will prove to be permanent, as the time elapsing after operation is far too brief to permit any such consideration. It is reported as an example of a most interesting and unusual pathologic condition.

PATHOLOGIC REPORT, BY E. W. MEIS, M. D.

The tumor was rounded and enclosed in a capsule, soft in consistency, and irregular in outline. The cut section presented a grayish appearance, and when the specimen was fresh a whitish liquid exuded from the surface. In the deeper substance of the tumor bile was found. The growth weighed one pound and four ounces. The dimensions were four and one-half inches by two and one-half inches.

Microscopically a large number of round and oval cells were found of varied sizes and shapes. In the center of the growth the entire liver structure was destroyed, and the sar-

comatous cells were in a state of degeneration. The cells were not developed, and no intercellular substance was present. The tumor is undoubtedly a sarcoma of the large, round-celled type. The vascular network was very conspicuous and formed a regular skeleton for the tumor, the cells being arranged around the vessels in the shape of a mantle.

Following is a complete list of the cases of primary sarcoma of the liver, including those which came to operation and those revealed by autopsy. Reference to some 26 cases, the literature of which was not available for this study and which for that reason were not included in that as authentic cases, are also given.

I wish to express my appreciation to Dr. Carl von Klein of Chicago for his most valuable assistance in the preparation of this article.

CASES OPERATED UPON

1. Von Bardeleben[16] reports a case of primary sarcoma of the liver. Age and sex of the patient not given. Tumor extirpated by wedge-shaped converging incisions. Sutures in the liver tissue failed to hold, and the wound in the liver was stuffed with iodoform gauze. Recovery, with no recurrence after two years.

2. Belfinger[17] operated upon a patient eight years old who had complained of pain in the region of the liver, loss of appetite, emaciation, and marked general debility. Tumor, dark-red in color and with smooth surface, was removed and wound packed with gauze. The microscope showed a round, red, sarcoma. Further course, unknown.

3. Bossosowski made an exploratory operation in a boy three years of age and found an inoperable primary sarcoma of the liver, and verified the diagnosis at autopsy.

4. Bossosowski, in the same article, reports another case in a boy of eleven years in which the lower border of the liver extended three finger-breadths below the ribs. In the right a painful, fluctuating tumor the size of an apple was detected. By means of an incision parallel to the ribs the liver was exposed and fixed in the wound and the abscess evacuated. Several smaller pus-cavities were then discovered and made to communicate with the larger cavity by burning the partition through with a paquelin cautery, leaving a hole the size of a man's fist. The surrounding liver-tissue was brittle and slate-gray, and examination of a fragment re-

vealed an alveolar sarcoma. Good temporary recovery. Further course, not stated.

5. Carmichael[19] and Wade made an exploratory laparotomy upon a male infant of four months with a liver-tumor, and found a large soft liver mottled with purple spots. No attempt at removal, and the infant died twelve hours later. Autopsy showed a primary, round-celled sarcoma.

6. Elliot[20] operated upon a woman of forty, removing an alveolar sarcoma the size of two fists, from the liver by means of the thermocautery with ligation of the large vessels. The liver-stump, four inches long and two inches thick, was walled off by gauze packing. The patient recovered, but died four months later from recurrence in the intestine.

7. A. H. Ferguson[21] in a personal communication reports a case of primary sarcoma of the liver in a man aged forty-three. There was a large tumor in the upper right quadrant of the abdomen compressing and depressing the stomach. Patient had lost forty pounds and was extremely weak. Operation, June 29, 1906. The entire left lobe was liberated by cutting through its ligaments and dislocating it completely outside of the abdominal cavity. Mattress sutures, passing through the entire thickness of the liver well beyond the growth, were inserted by excision of the tumor. These sutures were tied sufficiently tight to control capillary hemorrhage without cutting through the liver parenchyma. The peritoneum was then cut with the back of a knife. When a vessel was reached it was seized with mosquito-forceps and cut. The forceps and the mattress sutures completely controlled the hemorrhage. The vessels were then litigated with fine catgut. A large Mikulicz drain was firmly placed in the cavity, and the abdomen closed to the gauze. Patient left the hospital September 3d, and gained steadily in strength and weight. No recurrence at this date.

8. J. M. T. Finney, of Baltimore, in a personal communication, reports an exploratory operation upon a patient, age and sex not given, in which a primary sarcoma of the liver was discovered, which had progressed too far to permit of its safe removal.

9. J. M. T. Finney reports a second case in which an exploratory operation revealed a similar condition.

10. George Goodfellow, of San Francisco, in a personal communication reports operating upon a man between twenty and thirty years old for primary sarcoma of the liver with fatal result. No further particulars.

11. George Goodfellow, of San Francisco, in a personal

communication, reports a second case similar to the first.

12. George Goodfellow, of San Francisco, in a personal communication, reports a third case with the same results.

13. George Goodfellow, San Francisco, in the same communication, reports a fourth case with fatal result. These cases occurred in young men between the ages of twenty and thirty years. Full particulars lacking.

14. A. E. Halstead, of Chicago, in a personal communication, reports a case in a woman aged fifty. Six weeks before coming under his observation patient noticed a tumor in the right hypochondrium. Was losing flesh rapidly. Operation revealed a tumor, light-gray in color, attached to the under surface of the liver, into which it merged. As an incision seemed inadvisable, the abdomen was closed. Autopsy four months later showed primary sarcoma of the liver.

15. A. E. Halstead, of Chicago, in the same communication, reports a second case in a woman aged fifty-six. Five months before coming under observation the patient had pain in the upper right abdomen, accompanied by foul, light-colored stools, loss of appetite, and jaundice. Two months ago noticed a tumor in the right side of the upper abdomen. Has lost thirty pounds in weight. Operation revealed a large red tumor growing from under the surface of the liver. Its removal was considered impracticable, and after excising a small portion of it for diagnosis the abdomen was closed. Patient died two months later, and the autopsy confirmed the diagnosis of sarcoma.

16. A. E. Halstead, of Chicago, in the same communication, reports a third case in a woman fifty-four years. Seven months previous she had noticed swelling in the upper abdomen accompanied by pain, nausea and vomiting, weakness, and jaundice, all of which, intermittent at first, had become, during the last two months, constant and severe. Operation revealed a large, solid tumor, extremely vascular and grayish-red in color, connected with the under surface of the right lobe of the liver. Growth measured eight inches in length and six inches transversely. A wedge-shaped piece was excised for examination, and the wound in liver packed with gauze. Abdomen closed. Death one month later. Autopsy revealed sarcoma of the liver with numerous metastases.

17. Israel[21] reports an operation made upon a girl of fifteen for primary sarcoma of the liver, which, at its junction with the liver, presented a surface of fifteen square centimetres. The gall-bladder was first detached from the tumor; then with a mildly glowing, knife-shaped thermocautery the

tumor was severed from the liver. As hemorrhage became more and more profuse, Israel placed above the line of cleavage an elastic tube twice around the entire right lobe and then ligating with three strong, silk sutures, loosened the tube. Iodoform gauze was firmly pressed against the raw surface of the liver and brought out through incision. The patient recovered, to die three and one-half months later from metastasis. Microscopic diagnosis was telangiectatic angiosarcoma.

18. Krasnobazef[22] reports a case of sarcoma of the liver in a child eighteen months old. The physical signs suggested a subphrenic abscess, but at operation a soft sarcoma-nodule was found, and the autopsy revealed several others of the large round-celled type.

19. H. Lilienthal[23], of New York City, in a personal communication, reports a case of sarcoma of the liver, age and sex not given, upon which he operated with fatal result.

20. H. Lilienthal, in the same communication, reports a second similar case.

21. R. Matas, of New Orleans, in a personal communication, reports an exploratory laparotomy which disclosed an inoperable primary sarcoma of the liver.

22. Muller[25] operated upon an angiosarcoma in the right lobe of the liver, which appeared in a young woman during gestation. The tumor was the size of a fist, bluish, covered with dilated vessels, and broadly pedunculated. A strip of gauze was thrust through under the tumor, cut away, and tied on each side. The tumor was excised without hemorrhage, a few visible vessels ligated, and the stump fixed in the wound. Recovery, followed by death from metastasis nine months later.

24. Peterson[24] reports a case of primary sarcoma of the liver upon which he operated successfully. Seven months later there was recurrence. No further particulars.

25. Peterson[24], in the same article, reports a fatal operation upon second case of primary sarcoma of the liver.

26. Peterson[24] reports a third case, giving no particulars other than that he operated unsuccessfully.

27. Skiffassowsky removed a large sarcomatous tumor, the size of a man's head, from the quadrate lobe of the liver, with which it was continuous. The patient left the hospital two months later in good condition.

28. Knott reports a case described above.

CASES DISCOVERED AT AUTOPSY.

29. Arnold[26] reports a case in which autopsy in a boy of fifteen years revealed the liver considerably enlarged, surface coarsely granulated, and of yellowish color; in the right lobe a large tumor, with small surrounding growths; secondary nodules in the lungs, pleuræ, mesentery, and intestines.

31. E. R. Axtell[27] reports a case of a boy aged three and one-half years, in which the autopsy showed the liver to be greatly enlarged, weighing three pounds and ten ounces, with some perihepatitis on the posterior surface. The entire upper two-thirds of the liver showed no hepatic structure, but was thrown up in three masses, one of which sprang from the left lobe and pressed the diaphragm and the heart upwards; the second came anteriorly from the left border of the right lobe, which was a mass of new tumor material. Section showed a dark brownish-red mass, with occasional yellowish or creamy spots of fatty degeneration. In more recent areas section was light pink, studded with small red, brown, and yellow hemorrhagic patches. Well defined connective tissue trabeculæ were not found.

32. E. P. Boumann and J. G. Forbes report a case in an infant. Autopsy showed the liver occupying practically the whole of the abdomen. There were three main masses in which extensive small nodules were found on the surface and in the substance of the liver. Microscopic examination of the small nodules showed the growth to be composed of collections of round cells invading the liver-substance and separating the neighboring nodules by flattened and altered gland tissue or by inflammatory exudation and hemorrhagic areas.

33. M. J. Belin[29] reports a case in a man forty-eight years old, in which the post-mortem showed the liver much enlarged, blackened, soft, friable, and covered with prominences, which, however, did not form distinct tumors. Section showed a blackened surface emitting a black liquid. Microscopic examination showed the stroma composed of adult tissue, disposed in the shape of sclerotic islands and honeycomb structures containing tumor cells in irregular masses with granular protoplasm and rounded nuclei.

34. B. Bramwell and R. F. C. Leith report a case in which autopsy in a woman of twenty-five revealed the liver considerably enlarged and containing a cystic tumor of angiosarcomatous, spindle-celled type. There were small cysts lined with endothelium. The growth had evidently sprung from

the connective tissue surrounding the perivascular lymphatic channels.

35. R. W. Burnet[21] reports a case in which the autopsy in a woman of sixty-three years showed all the organs except the liver fairly healthy and free from any extraneous deposits. Liver enormously enlarged, weight 16 pounds and 11 ounces, but enlarged uniformly so as to retain its normal shape. Surface covered with small flattened knobs, like buttons. Numerous small masses of deposit were scattered through the whole liver varying in color from black to dirty-white. Microscopic examinations showed the structure to be sarcomatous.

36. C. W. Crispell[22] reports a case in a man aged seventy-four in which the post-mortem showed the liver cirrhotic, atrophied, and bound down at the lobus quadratus by strong adhesions. In the lower right lobe of the liver was a tumor, evidently primary, the size of a large orange, very pronouncedly separated from the hepatic tissue by a white fibrous band of tissue about two or three mm. thick. The contents were soft, pulpy, and sanguineous. Microscopic examination proved that this central pulp consisted mainly of blood and broken-down or detached sarcoma cells, with occasional giant cells and newly formed blood-vessels, some with distinct endothelial linings, others merely channels formed by the sarcoma cells.

37. Delépine[23] exhibited before the Pathological Society of London a section of a primary sarcoma of the liver.

38. B. De Vecchi and G. Guerrini report, in the same communication, a case in which the autopsy in a man of sixty-six showed the tumor contained numerous vessels of defective walls filled with blood, in places appearing like a cavernous angiosarcoma. Microscopic examination showed that the tumor consisted of accumulations of small fixed cells, and especially towards the center larger cells with vesicular nucleus, granular protoplasm, and small drops of fat, also abundant mononuclear giant cells and signs of necrosis. In places biliary vessels, with thin epithelial cells, may be found, as well as heaps of tumor cells.

39. De Vecchi and Guerrini report a case in which autopsy in a woman, aged fifty-eight, showed that the vessels of the tumor were few, empty, with defective walls, with evidences of hemorrhage in a few places. Microscopic examination of the tumor showed numerous cells, many elongated spindle-shaped, with a vesicular nucleus, some large and round, others still larger, with numerous nuclear figures.

40. W. W. Ford reports a doubtful case of primary sarcoma of the liver, associated with cirrhosis, in a man aged fifty-nine years. Autopsy showed the liver considerably shrunken, and the surface hard, rough and granular. Resection was performed with great difficulty, the fibrosis being irregular in distribution and practically no normal hepatic tissue left, the cut surface being pale-gray. In the left lobe of the liver was a large tumor mass, about 5 by 8 centimetres in dimensions, with a soft white, friable center surrounded by a dense, hard, grayish-white peripheral zone. Microscopical examination showed that the liver consisted of almost pure fibrous tissue infiltrated with small, round cells, only a few liver cells being left intact; fatty degeneration of the liver cells had taken place in some areas.

41. Frericks[36] reports a case in which the liver was greatly enlarged, weighed 13 3-5 pounds, surface and cross-section infiltrated with numerous large and small, black and white nodules. The liver tissue between these growths was icteric. In the left branch of the portal vein was an old thrombus. Was diagnosed as pigmented, spindle-celled sarcoma. Retroperitoneal lymph glands were infiltrated; in the lungs and pluræ were also a few small nodules. Otherwise no metastases. Nothing said about the eye and skin.

42. S. J. Gee reports a case of primary sarcoma of the liver in a male, aged five months. Post-mortem showed the liver greatly enlarged. All the lobes were studded with round, white, tough growths of varying sizes, up to that of a peeled walnut. Large quantities of liver structure were left unaffected between the new growths. On microscopic examination, the morbid growths were seen to consist of a dense fibrillated stroma, with small meshes, packed full of oval cells of uniform character, about twice the diameter of a red corpuscle, containing several glistening particles, but no distinct nuclei.

43. J. de Haan[38] reports a case of primary multiple alveolar angiosarcoma of the liver in a four-months-old child. On section the liver showed numerous blood-filled cysts. There was hardly any normal hepatic tissue to be seen, its place being taken by rounded areas of varying size, exhibiting a grayish color with dark centers. Microscopic examination showed a network of dilated capillaries, containing in its meshes numerous small round cells. The endothelium of the vessels was swollen; the cells assumed a more or less rounded form and closely resembled the tumor-cells. Hemorrhages were found in most of the large tumors.

44. G. Heaton[39] records a case of congenital round-celled sarcoma of the liver in a child of eight weeks. Post-mortem, the liver weighed forty-nine ounces; uniform, its lobes equally affected, covered with numerous red patches, separated from one another by pale-red areas. A careful microscopic examination showed the areas of a small-celled growth corresponding to the pale patches seen by the naked eye, cells uniform in size, packed together. The liver cells showed a considerable amount of alteration, being atrophied and, in many instances, so changed that their distinctive characters were lost, and they appeared as irregular atrophied cells. Numerous sections showed sarcomatous infiltration along the connective-tissue septa containing the blood-vessels.

45. Holsti[40] reports a case of primary melanotic sarcoma of the liver in a woman aged fifty-two. Post-mortem examination showed the following changes in the liver: The color of the surface was spotted dark-brown and grayish-red; over the darker parts the surface was uneven and scattered with dark-grayish, button-like growths of a soft consistency. A very large mass of similar soft tissue was found adherent to the suspensory ligament and adjacent liver-tissue. This was divided into large lobes, containing a fluid, grayish-brown mass. The parenchyma had a similar spotted color, the darker parts predominating. Microscopically it was found that the normal liver-structure had almost entirely disappeared. There was a large number of round and oval cells of variable size filled with dark pigment, which was also detected in the tissues outside the cells in the form of granules. There were similar growths scattered over the peritoneum, omentum, and the heart-muscle immediately under the endocardium.

46. Horub[41] reports a case in a woman, aged forty-six years, in which the autopsy showed the weight of the liver to be about six pounds. The tumor was situated towards the convex surface of the right lobe, measuring about five inches in any diameter. Microscopical investigation showed the tumor-tissue to consist largely of round cells, imbedded in scanty, finely grained, intercellular tissue, while everywhere were interspersed firmer trabeculæ, consisting of spindle-cells, of which several were larger and more granular, and were likewise connected by scanty intercellular tissue. The softer, more mucilaginous cells had the structure of mucous tissue. The neoplasm, as a peripheral section showed, developed especially from a granulation at the adventitia of the arteries.

47. K. H. Jones[42] reports a case of primary sarcoma of the liver in a male aged twenty-five. Post-mortem examina-

tion showed the liver greatly enlarged, weighing 11 pounds, 6½ ounces, closely studded all over with slightly raised, rounded, or oval whitish nodules. On section the liver tissue was found to be largely replaced by masses of sarcomatous tissue, from one-half inch to two inches in diameter, all very friable, some breaking down in their centers, while hemorrhage had taken place into others. Microscopically, the tumors were found to consist of a general infiltration of the lobules of the liver with small round cells.

48. C. von Kahlden reports a case in which autopsy in a man of thirty-two years showed an enlarged liver covered with numerous small and confluent nodules, some white, some yellowish in color. In the tissue that was still preserved the acini showed a retracted brown center and a swollen, yellow periphery. Microscopically, the tumor was found to be a round-celled sarcoma that apparently sprang from the endothelium of the blood-vessels.

49. A. A. Kauthack and E. L. Loyd report a case of primary sarcoma of the liver in a woman aged 70. Post-mortem examination showed a soft, spongy semifluctuating mass of growth, about as large as a cricket-ball, occupying the right lobe of the liver, which is elongated to a point below the umbilicus and contains many secondary nodules of growth. Microscopic examination showed many areas of irregularity where the liver cells were replaced by a mixed-celled new growth, the cells being separated by a very slight, delicate mucilaginous substance, varying much in size and shape, some being large and irregular, others smaller and spindle-shaped, and yet others round and oval.

50. S. Lang reports a case in a woman of twenty-seven years. At the post-mortem a large amount of straw-colored liquid was removed. The liver at once presented itself with several large, white nodular masses visible. The liver had slight adhesions to the duodenum; weight 13½ pounds, and filled with large round masses of new growth. Some of the masses at the surface were soft and semifluctuating; the growth proved to be a round-celled sarcoma undergoing degeneration and caseation.

51. Leisering[46] observed a round-celled sarcoma in a goat, aged less than a year. Post-mortem examination showed the liver enlarged to about twelve pounds' weight. Twelve hard yellowish globular tumors, ranging in size from a walnut to a fist, sharply distinguished from the surrounding liver-parenchyma, projected from a surface of the liver. Sections of these neoplasms glistened, and pressure with a knife ex-

pressed a turbid liquid from within. Under the microscope parenchyma of the tumor showed the elements of a round-celled sarcoma.

52. Lendrop[47] gives a case of an infant of about four months. Large tumor in the abdomen. No jaundice. At necropsy the liver was found to contain numerous disseminated tumors consisting of small round cells which seemed to originate in the endothelium of the interacinous blood-vessels and penetrate into the veins, where they compressed the liver-cells.

53. J. W. Legg reports a case of doubtful primary melanotic sarcoma of the liver in a man aged forty-two. Post-mortem examination showed the liver weighing 9½ pounds, preserving roughly its natural shape with the capsule somewhat roughened, covered with small yellowish-white, opaque spots, from the size of a pine-point to a pea, the latter apparently formed by confluence; also deep green prominences varying from the size of a pin-point to a pea, the latter apparently the right. On section, these tumors were seen to hold a dark-green pulpy substance, bounded by a thick white capsule which in some cases sent in septa. Microscopic examination showed, on the outside of the capsule, several layers of firmly compressed liver-cells, almost spindle-shaped from pressure, and cells resembling the liver-cells within, accompanied by quantities of green granules. I am inclined to believe that this is a case of primary sarcoma of the liver.

54. M. Litten[49] reports a case of melanotic sarcoma of the liver in a man aged thirty-seven. Post-mortem examination showed the liver enormously enlarged, inky black, hard, smooth, not granulated on the upper surface, and dotted with large protuberances of varying size, fluctuating, in some cases collapsed and filled with an inky fluid. This fluid contained polygonal cells, in many cases rounded, with masses of granules of black pigment. Microscopic examination of the tumor-tissue showed that it consisted mainly of spindle-cells, and in lesser degree of small round cells. The cells had, however, since they were almost without exception full of pigment, often lost their characteristic form and become round or polygonal.

55. H. Marx reports a case of primary sarcoma of the liver in a man of fifty-two years. The liver was enormously enlarged. Its upper surface was knotted with numerous, slightly prominent tubercles. The surface of the tubercles either had the appearance of the liver-tissue or else brownish-red, often hemorrhage on the summit. On section the liver

proved to be sown with bulky tumors of the most diverse sizes. On microscopic examination the large masses proved to be mainly coagulated blood, with masses of fibrin appearing partly as thick trabeculæ with alveolar spaces between, partly in a fine network within those spaces. The tumor-tissue was composed of uniformly large, but variously shaped cells, mostly round or polygonal. The liver itself showed in places extreme infraction, and impregnation with biliary coloring matter. The interlobular connective tissue was, in places, thickened and showed infiltration of small cells, especially around the blood-vessels and bile-ducts.

56. Meisenback[51] reports a case of myxosarcoma of the liver in an infant aged four months. Post-mortem: Liver presented smooth, symmetrical enlargement, color mottled, like red castile soap; peritoneum, slightly reddened; liver, enlarged, filling entire abdominal cavity, bulging up under the ziphoid cartilage, with inferior in the hypogastric region.

57. Millard[52] reports a case of primary sarcoma of the liver in a woman of about forty; apparently connected with an early menopause. Eighteen months later a number of small spherical tumors in the subcutaneous tissue developed in addition to the primary growth. The microscope revealed sarcoma of the spindle-celled type.

58. B. Naunym[53] reports a case of a woman aged sixty-two. Post-mortem investigation showed sarcomatous tubercles the size of a millet seed, scattered on the surface and in the interior. In the center of the liver a cyst was found which the author states was similar to that frequently found in cystic sarcoma of the mammæ.

59. R. W. Parker[54] reports a case of diffuse (?) sarcoma of the liver (probably congenital) in an infant aged five weeks. A partial autopsy showed the liver filled the abdominal cavity, its weight being thirty-two ounces. The appearance of the liver was a bright scarlet after removal from the body. When cut into, the color of the new growth was the same as that of the liver. The new growth was scattered throughout the entire gland as nodules, varying in size from a millet seed to walnut. It looked not unlike caseous material, but it could not be shelled out of the liver substance. The upper surface of the organ was irregularly though slightly nodulated; its capsule was shiny, and did not appear to be thickened.

60. P. Pellicani reports a case of primary sarcoma of the liver, age and sex not stated. Post-mortem examination showed that the liver weighed 3500 gm. and contained a tu-

mor measuring 88mm. in diameter, consisting of fusiform elements of varying lengths, and in the vena cava ascendens a very similar microscopic tubercle, which continued in attenuated form and was prolonged into the right auricle of the heart.

61. F. G. Penroshe reports a case of sarcoma (probably congenital) of the liver in a woman aged forty-four. Post-mortem examination showed the liver enlarged, weighing 13½ pounds. There were apparently no true liver-cells left, and the cells of the growth were of a sarcomatous type.

62. W. Pepper[57] reports a case of congenital sarcoma of the liver in a female infant aged one month. The liver could be felt either pushed forward or much enlarged. The child died, aged six weeks, and the autopsy revealed a uniformly enlarged liver weighing two pounds and six ounces, bulging out below the costal border and filling the abdomen almost completely. Sections of the liver showed it to be thoroughly infiltrated, almost transformed in fact, into a lymphosarcoma, which had not changed the shape of the organ at all. Small islets of the liver-cells remained, completely surrounded and compressed by the growth.

63. W. Pepper reports a case in a child of eight weeks, in good health until ten days before death. Post-mortem: Liver encapsuled by half coagulated blood; right lobe of the liver, normal; tumors in gall-ducts of the left lobe; network of large meshes, containing mononuclear cells. Diagnosed as carcinoma, but it was undoubtedly sarcoma.

64. K. Pilcher[59] reports a doubtful case of primary sarcoma of the liver. Post-mortem examination showed the liver greatly enlarged, weighing 6200 gr., 34 cm. wide, 30 cm. long, and 13 cm. thick. The outer surface of the liver was thickly sprinkled with numerous black and less numerous whitish-gray spots, about 1 cm. in diameter. The neoplasms so permeated the liver that only islands of the liver parenchyma remained. Microscopic examination showed clearly how the melanotic, spindle-celled neoplasms had developed within the blood-vessels, between the liver-cell trabeculæ.

65. G. M. Pitt[60] reports a case of sarcoma of the liver in a male aged ten months. Autopsy showed two pints of bile-stained fluid in the abdomen, and one large mass of growth in the greatly enlarged right lobe of the liver, with numerous secondary nodules scattered about. Microscopic examination showed that the tumor was a very vascular, small, round-celled sarcoma.

66. Podrouzek[61] reports a case in which the autopsy, in

a woman aged sixty years, showed the liver extended from the right second rib to below the umbilicus. The whole right lobe was taken up by the tumor, while in the left lobe only solitary nodules were found. Sarcoma of the spindle-celled variety. No metastases. All other organs normal.

67. Wm. Roberts[62] reports a case of cancer of the liver in a girl aged twelve years. Post-mortem examination showed that almost the entire right lobe of the liver was converted into an enormous oblong tumor. The left lobe was free from the disease, but enlarged to more than double its normal size. The tumor was 13 inches long by 12½ inches broad and 5½ inches thick, and weighed about eight pounds. On section the tumor showed encephaloid matter, masses of extravasated blood, and many cysts. The encephaloid masses were soft, reddish-white, vascular, some beginning to break down into a semiliquid, grumous matter; varied in size from an orange to a walnut, and were chiefly situated in the lower and posterior parts of the tumor. The hemorrhagic masses were composesd of soft clotted blood mixed with disintegrated matter. There were eight or ten cysts. The two largest, now partly collapsed and half full of turbid reddish purulent matter, had been punctured during life. The broken cysts varied in size from a marble to a small apple; some contained a jelly-like substance, others clear yellow serum. Evidently a sarcoma.

68. De Ruyter[63] related a case in a child of ten days. Post-mortem examination showed that the liver was hidden by a tumor extending from the costal border to the symphysis. The tumor had preserved the exact form of the liver, in which it had developed. The liver, or, more properly, the liver-tumor, was 20 cm. broad, 12.5 cm. high, and 6.5 cm. thick. The whole organ was enlarged proportionately. The capsule was moist, smooth, and glistening, and through it shone a yellow, speckled, brownish-red tissue. Section through the liver showed it to be very rich in blood, and that it was made up of a partly yellowish and partly grayish-red, marbled tissue of such indistinct composition that of the original liver-tissue practically nothing remained, but in its place, throughout the whole structure, one composed of alveolar framework of connective tissue filled with round cells. The connective tissue was rich in blood-vessels. In a few places were some irregular shaped multinucleated cells, which were thought to have been remnants of the old liver-cells.

69. H. H. Tooth reports a case of diffuse lymphosarcoma of the liver in a female child aged five years. Post-mortem:

Weight of the liver, forty-eight ounces; pale in color, and firm in consistence. No isolated growths, in fact, nothing to suggest a great overgrowth of connective tissue. Microscopically, small round-cells leucocytes. The lobules were separated from one another, and the gland-cells themselves were in parts completely surrounded by small-celled growths.

70. U. S. Marine Hospital Service, St. Louis, reports a case of a male, aged thirty-three years. Autopsy showed the liver dark on surface, covered with round protuberances, enormously enlarged, weighing about fifteen pounds, filling the entire right side of the abdominal cavity and crowding the intestines over to the left. The borders of the tumor were sharply defined in front, and it preserved, as a whole, the normal shape of the liver. The lower margins were bordered with circular bosses, ranging from the size of a cent to a half-dollar, each surrounded by a light colored, denser-feeling zone. On section, the liver proved an almost solid, light-yellow, densely cartilaginous growth, retaining only a few isolated patches of normal liver tissue.

71. E. Wagner[66] reports a case in a boy of five and one-half years, of feeble constitution. Eight days before the first symptoms (17th of March) a piece of wood had struck the abdomen. He died May 14th. Post-mortem: the surface on cross-section showed numerous whitish nodules especially profuse along the branches of the portal vein. The lumen of the gall-ducts and vessels slightly narrowed, their inner lining normal. Mesentery, peritoneum, and intestinal wall infiltrated with tumorous masses. Diagnosed as primary lympho-sarcoma.

72. S. West[67] reports a case of sarcoma of the liver in a female aged fifteen. A large mass was found on the under surface of the liver above the portal vein, involving the vena cava inferior, completely plugging it from above the entrance of the renal veins, and extending up to the heart, where it formed a mass in the interauricular septum. There was one nodule on the right lobe of the liver and another on the spleen. The tumor resembled a mass of gummata. Microscopic examination, however, proved it to be a fibrous sarcoma which had undergone extensive caseous degeneration.

73. C. West[68] describes a case in a child of eight months where at necropsy a medullary sarcoma of the right lobe of the liver was found. West describes this case as being a cancer, but from the description it must be regarded as a primary sarcoma of the liver.

74. Windrath[69] reports a case of primary sarcoma of the

liver in a male; young, age not stated. The enlarged liver showed beneath the surface and throughout the substance, a number of firm, grayish-red new growths, varying in size from tiny specks to walnuts or pigeon eggs and light red or grayish-white on section. Microscopic examination showed the cells to be small, spindle-shaped, with slightly granular or homogeneous protoplasm and oval, deeply stained nuclei. The cells lay in bundles crossing each other in every direction, with fine threads of connective-tissue, in a kind of alveolar arrangement between.

BIBLIOGRAPHY.

1. Vecchi and Guerrini, Medical News, November 23, 1901, p. 816.
2. W. W. Ford, Am. Jour. Med. Sciences, Vol. CXX, p. 43.
3. Vecchi and Guerrini, La Riforma Med., Tome XXII.
4. Pitt, Rolleston, "Diseases of the Liver," p. 498.
5. Pepere, Archiv. de Med. Experiment. et d'Anat. Path., Tome XIV, p. 805.
6. Rolleston, "Diseases of the Liver," p. 522.
7. Hale White, Guy's Hosp. Rep., 1890.
8. W. Ahlenstiel, Behandlung Archiv. f. Klinisch. Chir., Vol. LII, p. 902.
9. Ponfick, Lancet, 1890, Vol. I, p. 881.
10. J. E. Thompson, Annals of Surgery, Vol. XXX, p. 287.
11. Terrier and Auvray, "Les Tumeurs de Foie," Rev. de Chir., Vol. XVIII, p. 403.
12. Langenbeck, "Chir. der Leber und Gallenblase." Deutsch. Chir., 1897.
13. W. W. Keen, Annals of Surgery, Vol. 30, p. 267.
14. T. S. Cullen, Surgery, Gyn. and Obstet., Vol. IV, p. 573.
15. V. B. Knott, Annals of Surgery, Vol. XXXVII, p. 789.
16. Von Bardeleben, Verh. der Deutschen Gesellsch. f. Chir., 1893, Vol. XXII, p. 10.
17. Belfinger, Med. Korres. des Wurtemburg. Arztl. Land. 1906. Jan. 27.
18. Bossossowski, Medycyna, 1902, No. 28.
19. Carmichael and Wade, London Lancet, 1907, Vol. I, p. 1217.
20. Eliot, Penn. Med. Jour. 1897, Vol. I, p. 193.
21. Israel, Deutsch. Med. Woch. 1894, Vol. XX, p. 670.
22. Krasnobazef, Djetsk. Med. 1897, No. I.
23. Muller, Verhand des Deutsch. Chir. Kongress, 1897.
24. Peterson, Verhand. d. Deutsch. Gessel. f. Chir. 1898, Vol. XXVII, p. 124.
25. Skliffassowsky, Rev. de Chir. 1896, Vol. XVI, p. 984.
26. Arnold, Beitrag. zur Path. Anat. N. Z. Allgem. Path. 1890, Vol. VII, p. 123.
27. Axtell, New York Medical Journal, 1894, Vol. LIX, p. 273.
28. Bauman, E. P., and Forbes, J. G., Trans. of the Pathological Society Lond. 1885, Vol. XXXVI, p. 337.
29. Belin, M. J., La France Medicale, Vol. I, p. 98-111.
30. Bramwell, B., Edinb. Med. Jour. 1896, Vol. 42, p. 331-335. Oct.
31. Burnet, R. W., Trans. Path. Soc. Lond. 1885, Vol. XXXVI, p. 252.
32. Crispell, C. W., Jour. of Pathology and Bacteriology, 1906-1907, Vol. XI, p. 434.
33. Delepine, British Med. Jour. 1891, Vol. I, p. 175.
34. De Vecchi, B., and Guerrini, G., Riforma Medica, Feb., 1901.
35. Ford, W. W., American Jour. of Med. Sciences, 1900, Vol. CXLVI, p. 413.
36. Frericks, "Klinik der Leberkrankheiten," Vol. II, p. 319.
37. Gee, S. J., St. Bartholomew's Hospital Reports, 1871, Vol. VII, p. 141.
38. Haan, J. de, Ziegler's Beit. 1903, Vol. XXIV. Heft. 2, p. 215.

39. Heaton, G., Trans. Path. Society London, 1898, Vol. XLIX, p. 140.
40. Holsti, Finska Lakaresalliskapets Handlingar, 1895, Jan.
41. Horub, Hospitalstidende, 10 Jahrgang, No. 1, 1867.
42. Jones, K. H., British Medical Jour. 1906, Vol. I, p. 1463.
43. Kahlden, C. von, Ziegler's Beitrage, 1897. Vol. XXI, H. 2, p. 225.
44. Kauthack, A. A., and Lloyd, E. L., St. Bartholomew's Hosp. Report, 1895, Vol. XXXI, p. 105.
45. Lang, W. S., Edinb. Med. Jour. 1888-89, Vol. 34, p. 904.
46. Leisering, Sacks, B. S., 1873, 20.
47. Lendrop, Hospitalstidende, 1893, p. 217.
48. Legg, J. W., St. Bartholomew's Hosp. Reports, 1877, Vol. XIII, p. 141.
49. Litten, M., Deutsche Med. Wochensch. 1889, Vol. XV, p. 41, Jan. 17.
50. Marx, H., Ziegler's Beitrage zur Patholischen Anatomie, 1904, Vol. XXXVI, p. 591.
51. Meisenback, Weekly Medical Review, 1884, Vol. IX, p. 433.
52. Millard, L'Union Medicale, 1880, No. 123.
53. Naunym, B., Archiv. f. Anat. u. Physiol., 1868, Heft 6, Taf. XVIII, p. 710.
54. Parker, R. W., Trans. of the Path. Society of London, 1880, Vol. XXXI, p. 290.
55. Pellacini, P., Rivista clinica di Bologna, Agosto, 1880.
56. Penrose, F. G., Trans. Path. Soc. of London, 1880, Vol. XLII, p. 172.
57. Pepper, W., Am. Jour. Med. Sciences, 1901, Vol. 147, p. 289.
58. Pepper W., Path. Soc. of Phila., Med. Times, 1873.
59. Pilcher, Beischrifts fur Heilkunde, 1896, Vol. XVII, p. 259.
60. Pitt, G. M., Trans. of the Path. Soc. of London, 1898, Vol. XIL, p. 143.
61. Podrouzek, Prag. med. Wochenschrift, 1888, Vol. XIII, pp. 341-351.
62. Roberts, Wm., The Lancet, 1867, Vol. I, p. 77.
63. Ruyter, de, Langenbeck's Archives, 1890, Vol. XL, p. 98.
64. Tooth, H. H., Trans. Path. Soc. London, 1885, Vol. XXXVI, p. 236.
65. Report U. S. Marine Hosp. Service, St. Louis, 1890, p. 284.
66. Wagner, E., Jahresc., uber die Fortschritte der Ges. Medicin, 1865, p. 231.
67. West, S., London Lancet, 1890, Vol. II, p. 876.
68. West, C., "Diseases of Children," 1864, p. 764.
69. Windrath, I. D., Freiburg, B. 1885, p. 20.
70. Ackermann, "Die Histogene u. Histologie der Sarkome Melanotic," 32.
71. Autgua, Adatika a majelagematot tonahoz Arvosi netilap, 1886. Vol. XXX, pp. 409-433.
72. Cesaris-Demel, A., "Sul sarcoma primitivo del fegato." Arch. per le sc. med. forino, 1900, Vol. XXIV, pp. 273, 296.
73. Cesaris-Demel, A., Archiv. per le scienze med. 1904, Vol. XXIV, No. 14.
74. Dauwe, F., "Melanosarcome de la Foie." Bull. Soc. de med. de Gand, LXXIII, pp. 124-128.
75. Dionesi, A., "Sul sarcomi primitivi del fegato." Policlin. Roma, 1900, Vol. VII, pp. 553-570.
76. Fisher, K., "Ueber primare Sarcome der Leber," Wurzburg, 1900.
77. Gernelli, E., "Di un sarcoma primetivo del fegato." Riv. crit. di. clin. med. 1902. Vol. III, pp. 805-808.
78. Hetzel, K., "Ein Fall von Melanosarcoma der Leber." Erlangen, 1894.
79. Hewlett, H. M., "Primary Sarcoma of the Liver in a Child Fourteen Weeks Old." Intercolon. M. J. Australas. Melbourne, 1899, Vol. IV, pp. 615, 619.
80. Koniger, F. J., "Beitrage z. Kenntniss der primaren malignen Tumoren der Leber u. Leberpforte." Ann. d. Stadt.
81. Knoph, V. A., "Sluchai melonosarcomai pecheni" (Case of Allgem. Krankheiten der Mensch., 1907, Vol. XII, pp. 516 547. the Liver), Bolnitsch. gaz. Botkma. St. Petersburg, 1894, Vol. V, p. 905.
82. Kummel, Aerztlich. Verein in Hamberg, 1894, Oct. 10.
83. Nazan, A., "Contributo allo Studeo dei sarcomi primitivi del fegato." Policlin. Rome, 1906, Vol. XII, pp. 360-369.

84. Orth, M., "Ueber primares Lebersarkom," 1885, I. D. Strassburg.
85. Pepere, A., "I tumori maglígni primari del fegato (sarcomi epiteliomi)". Ricerche Anatomo-Pathologiche e considerazioni critiche. Naples, 1902.
86. Pieroni, N., "Un caso di Sarcoma primitive del fegato," 1903.
87. Rothrock, J. L., "Sarcoma of Liver," Trans. Path. Soc. Philadelphia, 1889-1891, Vol. XI, p. 19.
88. Salvani, E., "Sopra un caso di sarcoma primitive del fegato," Riforma Med., 1906, Vol. XXII, pp. 64-69.
89. Scheidemandel, "Ein Fall von primaren Sarkom der Leber." Diss. Erlangen, 1903.
90. Simonini, R., "Contributo allo studio di sarcomi primitivi del fegato." Riforma Med. Roma, 1902, Vol. XVIII, pp. 386-398.
91. Soare, L., "Di un caso di sarcoma melanotico fuso-cellulare del fegato secondario a quella della corridea con alame note sui sarcomi della wriode." Vianza, 1894.
92. Stimhaus, J., "Sarcoma magnifusa cellularis multiplex hepatis cum cellulis giganteris." Medycyna Waeszawa, 1900, Vol. XXVII, p. 534.
93. Stengel, A., "Sarcoma of Omentum and Liver." Trans. Path. Soc., Philadelphia, 1889-91, Vol. XV, pp. 25-271.
94. Virchow, R., Die Krankh. Geschwulste, Bd. II, 276.
95. Winternitz, M. A., "Ein Fall von Leber Sarkom." Ungar. med. Presse. Budapes. 1906, Vol. XI, p. 5.

DISCUSSION

DR. CHARLES H. MAYO (Rochester): As a fundamental organ, the liver is in marked contrast to the brain in its ability to repair itself after a portion of it has been removed. It is true, that large areas of the liver can be removed, and yet in a few months repair has been so rapid that one would hardly know by weight that any of the liver tissues had been removed.

With reference to primary tumors of the liver: It is a good deal like the brain in that the tumors which occur in the liver can be removed with about the same and no more satisfactory results to the patient.

I rise to speak more especially of the apparent fundamental difficulties in connection with suture of the liver. The lowest blood-pressure of the body is in the liver. You can sew it with anything. One would not use a Hagedorn needle, but a needle with a round point. If it is a large area of the liver one has to deal with, it may be necessary to take hold of it with large forceps, rubber-covered, and if you can put a little gauze on either side of the jaws of the forceps or use hand compression, you can sew through the gauze or over rolls of catgut. In this way you will have no trouble in suturing the liver and in being able to control hemorrhage.

DR. J. F. PERCY (Galesburg): I had a case which illustrates the difficulties in diagnosis. A woman came to me with every evidence of malignant growth of either the gall-bladder or the liver. She was cachectic and had begun to emaciate. I advised an exploratory operation, and found a

growth in the lower lobe of the liver, involving the gall-bladder, the growth extending about half way to the umbilicus. There were no adhesions. I did not attempt a resection. I did, however, take out a piece of the growth for microscopical examination, and two different pathologists reported exactly alike, that it was not a sarcoma, but was probably syphilis. This woman had none of the evidences of syphilis. She was a farmer's wife. She was the mother of three healthy children, with no history of miscarriages, etc. When I received this report from the pathologists, I put the woman on iodide of potassium, with entire disappearance of the tumor within a short time.

Dr. J. E. Summers (Omaha): I would like to say that in traumatisms of the liver, hemorrhage is difficult to control. I have had a large experience in treating cases of gunshot wounds and ruptures, and know that hemorrhage is not easy to control. The sutures are apt to tear out when they are not put in sufficiently to make proper compression, and especially is it difficult to control hemorrhage from gunshot wounds, except those which perforate the liver near its edges, and it is a mistaken idea that Dr. Mayo has given us. In fact, I know it.

Dr. Roland Hill (St. Louis): The control of hemorrhage from a clean cut of the liver is not so difficult as was formerly considered. Some time ago I assisted Dr. Cullen, of Baltimore, to remove a large sarcoma of the right lobe of the liver that made the removal of a wedge shaped section of this organ necessary. The piece removed extended from the anterior border to back beyond the gall-bladder and the patient lost perhaps a tablespoonful of blood, certainly not more.

In this case the overlapping mattress sutures were introduced and then a section of the liver controlled would be cut. In this way it was astonishing how perfectly the bleeding was controlled.

While on this subject, I wish to remind you that Dr. H. C. Dalton, of St. Louis, was the first American surgeon to call attention to the use of suture for control of hepatic hemorrhage. The principles he laid down are cardinal ones and must be followed if we would control hepatic hemorrhage successfully, viz., introduce your suture at least one inch from one edge of your cut and bring it out the same distance from the other border. In tying these sutures it is necessary to tie only tight enough to coapt the surface. The blood tension in the liver is so low that the slightest constricting force only is

necessary to control the bleeding, and more than the slightest tension will cause your suture to cut the liver substance.

Dr. W. D. Haines (Cincinnati): With reference to the diagnosis of tumors of the liver, we have had recently some experiments along this line by Weir, of New York. His experiments are still immature, but he has reported quite a number of findings, and one of the earliest changes in malignant disease is a great diminution in the hemoglobin, which accounts probably for the tendency in these cases to bleed so freely.

I saw a case which probably might have some bearing on this subject and did the work independently of the work done by Dr. Weir. The case was shown to be one of primary endothelioma of the liver. The patient was a man of good physique and of good habits, and his chief complaint was the great weakness which he felt. This man had a certain amount of ascites at the time, and his liver dullness extended almost to the median line. He was not jaundiced, and his digestion seemed unimpaired. His stomach secretions were normal, as were also the urinary secretions. We found blood in the stool, also lactic acid bacilli. The hemoglobin was reduced to 50 per cent and a mild leucocytosis was present. The man's health failed rapidly. He died three months after I first saw him. An examination of his abdomen at that time showed the largest liver I have ever seen; it almost filled the entire abdominal cavity. There were no metastases. The glands were not involved, neither the retroperitoneal glands nor the gland above the hepatic duct. In fact, the disease seemed to have been wholly confined to the liver itself. The pathologists reported primary endothelioma of the liver.

I had hoped from the experiments of Weir something might come forth in the way of assisting us to make an early diagnosis of malignancy, not only here but elsewhere. Until we can find some method of making an earlier diagnosis, in malignancy, frequent recurrences and finally death will mar our reports.

Dr. Knott (closing the discussion): It is interesting to observe how a man's environment will influence his opinion. Dr. Mayo has had a large experience along certain lines, but he may not have had nearly so large an experience with liver trauma as many men here present.

I wish to indorse the remark made by Dr. Summers, that at times it is extremely difficult to control hemorrhage from the liver. I have seen two fatal cases of this class, one of my own and the other in the care of a colleague, in which, though

every reasonable effort was made to control hemorrhage, it persisted with fatal result. I believe many of you who have had experience with acute and traumatic surgery have seen such cases. It is one thing to control hemorrhage from this organ after the removal of the gall-bladder or some small liver neoplasm, and quite another to control the gush of blood from a large rent in the liver tissue with wide separation of its edges. In many such cases the hemorrhage is controlled with utmost difficulty, and one who has attempted in such a case to suture the liver substance with an ordinary needle, using an ordinary style of suture, can appreciate this difficulty. In my experimental work upon dogs I found that large liver wounds bled profusely and were very difficult to coaptate, and that the hemorrhage was alarming and hard to control. For this reason I am not willing to admit that all the time and ingenuity spent upon the subject of liver suture and the control of hemorrhage from wounds in this friable tissue have been wasted. Mikulicz, whose opinion all respect, said that in his opinion the needle of Kousnietzoff had greatly simplified the subject of liver surgery and placed it for the first time upon a satisfactory footing, and that by its use hemorrhage formerly always difficult to control could be stopped.

TORSION OF THE OMENTUM

WILLIAM W. GRANT, M. D.

DENVER, COLORADO

The greater omentum begins to occupy, in recent years, a more conspicuous place in the eyes of the physiologist, the pathologist, the physician, and the surgeon. From its position as a protective blanket to the intestines, and as aiding perhaps in their motility, it is believed to perform important blood-functions, notably, by some authors, in the development of phagocysis and opsonins. While Narath has utilized it, stitching it into the subcutaneous cellular tissue and improving the collateral circulation through the epigastric, internal mammary, and azygos vessels, in cirrhosis of the liver, called a modification of the Talmas operation. Besides its own pathological condition, the most important recent development and exposition being torsion, we find it performing a most useful function in various diseased conditions of associated organs. Surgeons are familiar with its conservative offices in enveloping a gangrenous appendix, a pus-tube, the gall-bladder, and ulcers of the hollow viscera, thus mechanically and by timely adhesions preventing immediate septic peritonitis and its dangerous consequences, and also giving valuable aid to the surgeon in the too-frequent and unfortunate delays in dealing with these conditions.

On December 9, 1904, a young man (J. M. Duncan), aged 28 years, called at my office at 5 P. M., with the following history: He had suffered since noon with

pain in the stomach and abdomen; had occasional nausea and had vomited once; there were slight distension, pain, and tenderness on pressure in the right hypogastrium; temperature, 99°; pulse, 80. The tenderness covered a larger area and was more marked slightly to the inner side of the spot common to appendicitis; the abdominal walls were fat; the patient weighed 200 pounds; no tumor palpable.

Believing the history and the condition indicated appendicitis, I urged immediate operation, but was persuaded to wait until morning. I saw the patient at 8 A. M., December 10th. He had slept none, on account of constant and severe abdominal pain all night; vomited once; distension increased, though still not great; tenderness in right hypogastrium, much greater, and there was dullness, but no distinct tumor, though it was difficult to make out, on account of the thick and fat abdominal walls; temperature, 100°; pulse, 96. Some rigidity of the abdominal muscles.

He was taken to St. Luke's Hospital and operated on, well within twenty-four hours from the beginning of the attack. With an oblique incision over the cecum and appendix, I introduced two fingers and immediately felt an unusual, rather elastic, lobulated mass, which I perceived to be omentum. Not wishing to make a large opening, I soon succeeded, by gentle manipulation, in bringing the first or anterior mass, as large as the hand, out of the wound. All veins on the under surface were thrombosed, and the mass excised. The succeeding or under tumor was now easily pulled out, and with it a coil of ileum, to which it was intimately adherent a few inches from the cecum by a broad base nearly an inch in length and fully half an inch thick. It was transfixed, ligated, and severed, and the peritoneal edges were inverted and stitched over the cut surface to prevent adhesions. The omental mass was very dark and gangrenous and completely

separated from the body of the omentum, which, I assume, was due to a fourth twist, though there was but one distinct pedicle, which is beautifully shown in the specimen and photograph presented. There were also three twists in the mass, which is as wide and as long as the hand. The adherent intestine was perfectly healthy in every respect, with no constriction and no evidence of past disease, and there were no other adhesions to the viscera, or to the abdominal or hernial rings. About a quart of dark, bloody serum was mopped out of the pelvis. The appendix, only slightly congested, was also removed, and the wound closed without drainage.

Recovery was prompt and uneventful.

I subsequently learned from his mother that when two years old he had a hernia of the right side, for which Dr. J. D. Griffith, of Kansas City, applied a truss, which was worn for two years and resulted in a complete cure. Since that time no hernia has existed, and he has had no illness until the present, although he has had for a year or two an occasional indigestion, with vomiting.

In view of the most common association of this diseased condition with hernia, it becomes a matter of unusual interest in this case as to its possible connection with hernia in earliest childhood. I am positive, from the nature and character of the adhesion, the condition of the intestine and the absence of any indication of disease, past or present, of every other organ or part, that it was of long standing. It seems possible that it could have dated from the existence of hernia in childhood without causing intestinal obstruction or torsion at an earlier date. The vomiting may have been due to a momentary obstruction from volvulus, due to the adhesion and intestinal peristalsis.

In this connection a few bibliographical notes are interesting and instructive. Simon (Munch. med.

Wokensch. 105, 522, 1879) records 31 cases reported from various sources. Twenty-five were intra-abdominal, and only two not associated with hernia, and the diagnosis in the two cases of his own was appendicitis.

Corner and Pinches (American Journal of the Medical Science, 1905) make a report of cases for ten years, ending with 1904, 53 cases in all (36 males and 17 females); more common in middle life. With the exception of six purely intra-abdominal cases, hernia was present in all, or in 90 per cent. In most cases onset was sudden, and gradual in seven. In the abdominal cases the onset was sudden, and the symptoms were those of appendicitis. Pain was the most constant symptom, and vomiting was present in about half the cases; constipation was the rule; the pulse was quickened, and the temperature was slightly elevated; tumor was present in all but three cases; firm and tender on palpation, and in many dullness on percussion; surface, irregular; distention, in minority of cases. Eight of the 53 cases died, showing a mortality of 13 per cent. In ten or twelve per cent of the cases the hernia present was irreducible and painful.

Richardson of Los Angeles (Journal of American Medical Association, May 11, 1907), in an excellent review of the literature and reported cases, adds seven to the list, making 61.

I agree with him, that strangulation of the omentum from pressure or adhesions does not constitute torsion, and should not be classed as such. Only seven cases were entirely intra-abdominal. My own makes eight. The torsion may be single or double. It is usually the former.

In the intra-abdominal cases the symptoms closely resemble those of acute appendicitis, and, up to the present time, with a probable diagnosis of the latter. Even in hernia the abdominal symptoms are pronounced in most cases. The tenderness and dullness,

Torsion of the omentum.

at an early period, cover a wider area than in appendicitis; yet, if on the right side, both subjective and objective symptoms simulate those of acute appendicitis. If hernia exists, one should be on guard, especially as to the differential diagnosis.

I believe this case unique and exceptional in being completely amputated, by torsion, from the body of the omentum, and in being fixed by adhesion to one point of intestine, and to nothing else.

DISCUSSION

DR. J. D. GRIFFITH (Kansas City): I am very glad to have had the opportunity of hearing this very interesting case reported by Dr. Grant. It is certainly an exceptional one. On two occasions in operating, pieces of omentum seem to have separated from the main body of the omentum and its attachment to the intestines, but without any history of trouble connected therewith.

As to this case of the child: I did not know anything about it until I heard him read about it. I remember very well that the child had an omental hernia at the time, and I reduced it and put on a truss. The probabilities are that I tore off, in my reduction, a part of the omentum, or that which had been torn off went back into the abdominal cavity.

THE CONFUSION OF APPENDICITIS WITH OTHER DISEASES OF THE FEMALE PELVIS

ARTHUR E. BENJAMIN, M. D.

MINNEAPOLIS, MINNESOTA

In 1808 Ephraim McDowell, of Danville, Kentucky, diagnosed and successfully operated upon an ovarian tumor. A similar laparotomy was performed by John L. Atlee, of Lancaster, Pa., in 1843, and it was not until after this operation that gynecological surgery developed and the operation was repeated by other surgeons here and in Europe. This period marked the foundation of all future abdominal surgery. So much success attended the operations upon diseased ovaries and tubes that this class of surgery became quite popular among certain specialists. Operations became more numerous, and the field began to widen. So enthusiastic were some of the men that many hitherto unexplainable symptoms began to be attributed to some disease of the ovaries or tubes, consequently these organs were often operated upon and removed unnecessarily.

Quite often patients continued to suffer with the same complaint, or new symptoms developed. This post-operative suffering that continued for months, and perhaps for years, was attributed to the ligature (often of silk), which was used to tie off the broad ligament or tube, and was termed the "painful stump." In such cases, later, the primary cause of suffering was

found to be a disease of the appendix, gall-bladder, kidney, or some other abdominal organ, and a cure was established only when the appendix was removed or the actual disease eradicated.

As these facts became generally known, and the role a diseased appendix played in the cases, the pendulum began to swing in the opposite direction. This organ was then blamed for many a symptom complained of. A tender McBurney's point or any other right-sided pain became the *sine qua non* for an operation.

The reputation of many men grew for no other reason than that they confined their work to men, or by chance happened upon the organ causing more or less disturbance. These and many others met their Waterloo when they began to widen their field of usefulness (?) and to attribute the cause of nearly all distress in women, as well, with more or less complex symptoms, to a diseased appendix.

When such patients continued as great sufferers as before the operation, it perplexed the operator and discouraged the patient, and also cast discredit upon surgery in general. It remained for the gynecological surgeon to step in and point the way. Instead of working downward he was "upward striving." He had long before this solved the problems of pelvic surgery, had gone beyond the appendix and had about reached the gall-bladder and stomach. The theory of a definite relationship in many cases between a diseased tube or ovary and the appendix was established in some instances between the appendix and the gall-bladder.

The mistakes made in diagnosis at the present day, are the result of carelessness or ignorance on the part of the physician. Because of the scarcity of time a number of physicians go over the history of their cases incompletely. An examination is superficially

made, or the physician is not familiar with the complex diseases of the abdomen. He therefore naturally, because of his narrow vision, attributes the symptoms to a disease with which he is at least partly acquainted. He advises the removal of the appendix. The consequences are no more than could be expected: the case is partially helped or totally unrelieved. The appendix, removed, may have had some of the earmarks of a diseased one, yet it may have caused little or no suffering.

UNUSUAL LOCATION OF A DISEASED APPENDIX PRODUCING MISLEADING SYMPTOMS

The location of the appendix greatly modifies the symptoms even in a simple case. Especially is this true when adhesions to neighboring organs occur, such as to the gall-bladder, tube, ovary, uterus, bladder, hernial sac, abdominal wall, loop of intestine or adherent to peritoneum over the ureter or high up back of the colon.

Symptoms of disease of any of these organs to which the appendix is adherent, may be present, such as gall-stone disease, or tubal or ovarian trouble. Then symptoms of renal calculi, stones in the ureter, etc., may be observed when the appendix is attached over the ureter.

Symptoms of cystitis, with frequent and painful micturition, are observed when the appendix is attached to the bladder. When the appendix is located on the opposite side of the abdomen and adherent to a coil of intestine, a mistake in diagnosis is very likely to occur. An unusually long appendix may encircle a loop of intestine, causing acute obstruction of the bowel. An appendix is occasionally found within a hernial sac at operation, and thereby explains the peculiar symptoms in such instances. Symptoms of

strangulation without external or palpable signs of the same are often present.

In case of gangrene, rupture, and peritonitis or abscess-formation, all symptoms are greatly aggravated, and one of the most virulent conditions may occur with systemic infection when the appendix is located high up back of the colon. Here the lymphatics soon carry the poison into impenetrable localities. In case of rupture, contiguous organs, sooner or later, are involved to such an extent that when an abscess occurs and the examination is made, it may be too late to determine which organ was the primary seat of the disease.

Other diseases of the abdomen which may be associated with appendicitis are—

Gastritis and perigastritis with adhesions,
Gastric ulcer,
Duodenal ulcer,
Duodenal obstruction,
Duodenal adhesions,
Gall-stones,
Cholecystitis,
Gall-bladder adhesions,
Liver abscess,
Pancreatitis,
Nephritic colic,
Nephritic stones,
Hydronephrosis,
Cystic kidney,
Cancer,
Intussusception,
Volvulus,
Meckle's diverticulum,
Viceroptosis,
Gastric dilatation and prolapse,
Nephroptosis.

As my paper deals especially with the pelvic asso-

ciation of appendicitis, I shall refrain from saying much about these conditions, except to mention some necessary points.

Gall-stone disease is so frequently associated with appendicitis that it is necessary, in some instances, to withhold a positive diagnosis until the case is operated upon. As duodenal ulcers with adhesions are confounded with gall-stone disease they, too, are confusing to the diagnostician.

A prolapsed kidney with a kinking right ureter resembles in some degree appendiceal colic or disease. A troublesome Meckle's diverticulum may accompany, or the symptoms may resemble, an attack of appendicitis. I have seen a few cases of this nature. In each of two cases there was a badly diseased appendix. In one the verticulum was adherent to the cecum.

DISEASES OR CONDITIONS OF FEMALE PELVIS ASSOCIATED WITH OR SIMULATING APPENDICITIS

Salpingitis.
Peritonitis.
Ovaritis.
Prolapsed ovary.
Twisted pedicle of ovarian cyst.
Fibrocystic ovary.
Adherent ovary or tube (chronic).
Retrodisplacement of uterus.
Retrodisplacement with adhesions.
Tubercular peritonitis.
Cancer or tumors.
Ectopic pregnancy.
Ureteral stones.
Bladder stones.
Cystitis.
Fibroid of uterus (parasitic).

Acute salpingitis is frequently diagnosed appendi-

citis, and an immediate operation advised, and often performed, for the removal of the appendix.

Personally, I see a great many young women who have had the appendix removed, but not their disease. There are often later, positive signs of peritonitis, ovaritis, and fibrocystic degeneration of the ovaries or pyosalpinx and tuboövarian abscess in these cases. On the other hand, I have seen young women greatly afflicted with pain from adhesions and disease of the adnexa in whom no known reason for such a condition existed, other than from attacks of appendicitis, not recognized, when they were young girls. In some the disease had nearly destroyed the tube and ovary.

I have frequently observed, even in young women, alone or associated with a retrodisplaced uterus, a chronic hypertrophy of the tube, thickened tunica of the ovary, and numerous small or medium-sized cysts. These cysts may not be painful if the ovarian covering is thin, or after the cyst has burst through this wall. More frequently—and this is found in the moderately enlarged cystic ovary—the tunica is very thick and firm, resulting in severe pain at the menstrual period because the ovary cannot expand or allow of ovulation. Cysts form in the Graafian follicle or corpus luteum.

Perhaps a chronic congestion of the pelvic organs is responsible for this condition and acts as an equal causative factor of a chronic form of appendicitis, which is so frequently associated with this form of trouble. It is unnecessary to sacrifice these ovaries in an operation; a simple resection with the removal of the cysts and the outer thick covering of the ovary should be practiced. A modified Gilliam operation restores the uterus and adnexa to their normal circulatory plane. Dysmenorrhea, so frequently complained of and often unrecognized in this class of cases, is relieved and with the diseased appendix excised through the one median inci-

A collective picture showing the various points of attachment of the vermiform appendix to the gall-bladder, kidney, abdominal wall, ileum, uterus and the adnexa, sigmoid flexure, bladder, and a hernial sac.—From Kelly.

Appendix adherent to the cystic ovary, and the ovary adherent to the uterus.

sion the results are all that is to be desired. When the right ovary is the one particularly affected, a diagnosis of chronic appendicitis may be excusable, especially if the ovary is not palpable.

At each menstrual period there may be an acute exacerbation of an appendiceal inflammation because of the pelvic congestion and a dysmenorrhea with nausea, vomiting, and obstipation, etc. When adhesions are formed between the appendix and the adnexa the symptoms are distressing.

If a pyosalpinx exists or in a tuboövarian abscess there is more likelihood of the involvement of the appendix, an opening into the abscess cavity with drainage is of immediate benefit, but later a salpingectomy is essential, with an appendectomy for permanent relief.

In cases of tubercular infection, beginning in the right tube, there is soon an involvement of the peritoneum, the appendix, and ovary, with confusing symptoms. There are usually severe pains, low blood-count, and moderate temperature (especially afternoons); and the attack resembles a mild form of appendicitis. Later, the disease not only involves the appendix, ovaries, and uterus, but the intestines become greatly matted together, and relief is effected only when the primary seat of the disease is removed, including the appendix, cysts, tubes, and, possibly, the ovaries.

Ectopic pregnancy is quite frequently diagnosed as appendicitis. I have not been certain in four of my own cases before operating which condition I should find. All the others were diagnosed. If the case is seen early, possibly during an attack of pain, the low temperature, faintness, and history of metrorrhagia and menorrhagia, with some possible fluctuation or soft mass in the pelvis, would differentiate it from appendicitis. But from the fact that this condition is usually

right-sided, in my experience, and that the case may be seen after a rupture has occurred and the temperature above normal, especially if there be infection, the diagnosis is not so simple.

In such cases I have learned to depend more upon the history of the case than upon examination. Cases complicated with pelvic adhesions, cysts of the ovary, and a peri-appendicular inflammation, present confusing symptoms. Three of my cases not positively diagnosed, were of this variety; a fourth had a large pelvic abscess.

I have not operated upon each case of ectopic pregnancy as soon as diagnosed, but have waited until the patient was over the immediate shock. In one desperate case, with numerous adhesions, ligatures controlled the bleeding, and a later operation cleared up the associated disease. By choosing the time to operate, and being conservative, I have saved all but one late case, namely, one coming to me with diffuse peritonitis and systemic infection.

A parasitic fibroid detached from the uterus and adherent to omentum, bowel, appendix, tube, or bladder, especially when to the appendix, is a somewhat rare condition, but should be thought of in considering a possible attack of appendicitis.

Chronic cystitis, with or without stones, occasionally gives rise to such diffuse pain as to resemble a typical attack of appendicitis; and if associated with stones in the right ureter, a careful investigation with the cystoscope, ureteral catheter, and *x*-rays should be made before a diagnosis is ventured.

The most puzzling cases are those where so many organs are affected that it is hard to pick out the greatest offender; for example, in women in whom there is a relaxed condition of the abdominal wall, resulting in viceroptosis and a dilatation of the stomach,

also with disease of the tubes and ovaries and a tender appendix. Many of these cases are of a nervous temperament, either by nature or acquired as the result of the disease.

The pain, suffering, nausea, and vomiting, and also the distress of mind that these individuals endure, are beyond description. A careful analysis and proper estimation of the true significance of each symptom is indeed difficult, and the relation of cause and effect is hard to estimate.

I am of the opinion that, independent of the nervous symptoms, as many of the pathological or unnatural conditions should be corrected as is possible, consistent with the safety of the patient, endeavoring to select the route most suitable for the purpose, and the disease most important first.

Many of the nervous symptoms disappear after work of this sort. At operation the condition of all organs within reach should be observed and recorded for reference and benefit to the patient in future illnesses. The time for this additional investigation is of short duration and the danger is almost nil. It will repay one, I am sure.

In conclusion, I would say—

Any inflammatory disease within the abdomen primarily involving one organ, from continuity or contiguity, results in other tissues or organs being involved.

The blood-supply of the abdomen and pelvis is such that infectious microörganisms may be carried from one diseased organ to another, thereby starting a similar disease in a part through which this infected blood flows.

The lymphatics may also convey disease to organs in the line of their distribution.

The nerve-supply of the organs of the lower abdo-

men and pelvis and their sympathetic relationship are such that pain may be referred to localities not affected.

It is possible for more than one form of disease to exit within an abdomen simultaneously and the symptons become quite complex thereby.

Besides actual disease there may exist one or more misplaced organs, thereby changing the symptoms considerably in the presence of disease, or resulting in contiguous organs being affected because of this displacement.

Also the misplaced organ alone may cause distress that resembles some actual form of disease.

The character of the disease, the variety of each form of disease, the number of organs involved, the associated displacement of organs, the temperament, environment, and vocation of the individual sufferer, are all factors to be considered in summing up the case.

A careful personal history of the case, a thorough physical examination of the individual with the aid of chemical and bacteriological investigation, and a searching examination with all the apparatus at our command, e. g., the cystoscope, proctoscope, microscope, and *x*-ray, will clear up the majority of cases.

In certain cases, if no positive diagnosis can be made, there may be clear indications for operative interference to cure the disease.

In complicated cases a thorough search through a proper-sized opening should be made to terminate the symptoms complained of, and a record of all findings made for future reference.

INTESTINAL OBSTRUCTION: EXPLORATION

BENJAMIN MERRILL RICKETTS, Ph. B., M. D., LL. D.

CINCINNATI, OHIO

1. Obstruction is the stoppage or blocking of a canal or opening in the body, due to any of the numerous causes. The symptoms, such as vomiting, pain, distention (symmetrical or asymmetrical), sweating, collapse, rigid parietes, and toxemia, one or all, may be present in any form of obstruction in the large, as in the small, bowel. These being facts, why should exploration be delayed when simple incision through the belly-wall is done without mortality?

2. Should exploration and direct digital and ocular examination of the abdominal viscera be delayed in intestinal obstruction, because experiments, reports, symposiums, and discussions have failed satisfactorily to explain its etiology, symptoms, and treatment?

Conservatism is that which serves best, whether it be delayed or served immediately. If delay is conservative, all well and good; if not, enrobing in such a fabric when called upon to assume the responsibility of managing one of the most desperate conditions within the domain of surgery, is cowardly. No question should arise, in the face of a fixed duty, as to the risk of injury to the reputation of those in charge, considered in the event of disaster.

The master (Tait) said that "the belly should be opened to see what is the matter, not to see if there is anything the matter". What more appropriate

remark could be made to-day concerning the question of opening the belly in a given case, even with the improved methods of diagnosis?

The success of the fireman is proportionate with the progress of the fire and environment at the time he is permitted to apply the remedy; so it is that any degree of one or all of the symptoms of obstruction are sufficient evidence to call for immediate, radical action for its termination.

The general alarm should at once be sounded, and all available means brought to bear upon the conflagration. Every department of medicine and surgery should be brought into requisition. The need of a remedy by hypodermic injection, that will produce catharsis, is evidenced, especially in non-mechanical obstruction. As yet there is no known symptom, or group of symptoms, by which mechanical and non-mechanical obstruction may be differentiated, nor can the type or degree of the milder forms of obstruction be determined.

The three kinds of paresis given by Deaver answer every practical purpose:

1. Obstruction following immediately after operations.
2. Mechanical obstruction.
3. Result of septic peritonitis.

Accepting this classification, ordinary observation should prompt earlier radical measures, for the relief of a condition which is the bane of the existence of all who have to do with it. Anxiety begins with the first link in the chain of symptoms, and increases as the links are added.

Obstruction probably has a higher immediate mortality, with or without intervention, than any of the surgicopathological diseases.

The non-mechanical type without operation has a supposed mortality of 90 per cent when not compli-

cated with general peritonitis, and from 60 to 84 per cent with operation. This mortality in post-operative obstruction exceeds that of pre-operative obstruction of the same degree, whether of the mechanical, non-mechanical, or septic type. This increased mortality is due to the added surgical trauma, and especially to the anesthetic.

In the mechanical type the mortality is given as 100 per cent without operation, and from 50 to 80 per cent with operation. This difference in percentage is probably due to the advantages of palpation and the Roentgen ray in detecting neoplasms and foreign bodies, which are its most common cause, hence, earlier surgical measures may be resorted to. In the septo-peritonitic type without operation, the mortality is generally given as 100 per cent, while with operation it is somewhat less.

There are certain forms of obstruction, with or without infection, that have been considered invariably fatal. If this is so, there is nothing to be lost in opening the abdomen. If, after opening the abdomen, an imperfect mechanism within can be made perfect without destruction of the nerve- or blood-supply, in the absence of infection, surely many more cases would recover; and even with many forms of infection this is probably so. But if the patient has become exhausted, from vomiting, pain, infection, or want of nourishment, with or without infection of any kind, the mortality will be proportionately high.

Pain, distention, and vomiting are always alarming; and the majority go on to death regardless of any effort to relieve them. Intoxication has not yet been proven to be the cause of death in any given case of obstruction.

If cases of obstruction, indicated by one or more symptoms, are opened at their onset, under ordinary precautions, the mortality, no matter what the cause

may be, will be less than if operated on late in the attack. The element of delay in surgery is more serious than the element of aggressiveness. In no other surgical condition is this statement more fully verified.

The most skilled operators have many times opened the abdomen for a condition made certain by one or more symptoms, and found one entirely different. If this is sanctioned in other lesions of less importance within the abdominal cavity, why cannot exploration for obstruction based upon one or more symptoms be done? This will determine the character and degree, if obstruction is present; if not present, no special harm will ensue. If the character or degree or both are believed to be fatal, the remedy should be given, regardless of its character, because that verdict is only an opinion, not a proven fact.

HERNIA OF THE APPENDIX, COMPLICATED WITH APPENDICITIS

DAVID W. BASHAM, M. D.

WICHITA, KANSAS

Though the subject of this communication is of but minor importance, the comparative infrequency of hernia of the processus vermiformis ought to justify the report of every case encountered.

It may be argued from the practical standpoint that it is of no importance to the surgeon or the patient to know beforehand what is contained in the sac of an hernia, and that the operation is the same, no matter what the condition. This is to be granted if we allow that the office of the surgeon has no aim beyond the ability to do an operation and dispose of the ordinary complications to be dealt with. But, as the principles of medicine are being more and more crystalized into a science, diagnosis assumes a higher place in the mind of the surgeon; besides, the world has always expected us to understand the things we undertake.

The diagnosis of hernia of the appendix will always be surrounded by difficulties, but, bearing in mind that such a thing is possible and having a knowledge of the phenomena attending the condition, it will, in most instances, be possible to make a probable diagnosis. When the processus vermiformis is inflamed in the sac of a hernia the clinical picture is that of a strangulated enterocele minus the obstruction that

usually attends the latter. In differentiating hernia of the appendix with inflammation from strangulated enterocele, it is well to remember that in the former the symptomatic syndrome is that of an inflammatory condition, while the phenomena of obstruction predominate in the latter. Levy lays stress upon pain felt about the umbilicus. In my own case there was great pain in the right iliac region. The form of the sac is alantoid, except when the appendix enters the sac doubled upon itself. An epiplocele may have the same appearance, but is usually not so distinctly fusiform. The appendix in the hernial sac may be mistaken for a gland. The percussion-note in both omentocele and hernia of the processus vermiformis is dull.

No age is exempt from hernia of the appendix, but it has been observed far more frequently in the aged, and more often in the male sex. The appendix has been found more often in right inguinal, than in crural, hernia. This probably accounts for its greater frequency in the male sex. It has been found in left-sided hernia. The appendix may occupy the sac of congenital, as well as that of acquired, hernia. Levy has raised the question as to whether inflammation of the epityphlon is the result of incarceration, or whether the incarceration is due to inflammation and consequent swelling of the organ. He inclines to the belief that inflammation precedes incarceration. It is said that an attack of epityphlitis predisposes to hernia of the appendix.

The causes of appendicitis in the herniated organ are the same as the causes of inflammation in the organ in situ naturale. It must be remembered, however, that trauma is infinitely more frequent in the herniated appendix than in the appendix in its normal situation.

As before stated, by far the greater number of cases

of inflammation of the herniated appendix occur in aged patients. Levy accounts for this on the hypothesis that rheumatism predisposes to the formation of calculi and that diminished persistalsis in the aged prevents the appendix from emptying itself as readily as in youthful patients. This authority gives the causes of inflammation of the herniated appendix as traumatism, concretions, foreign bodies, and digestive disturbances.

Perityphilitis may give rise to a serous effusion into the sac. Grave cases may be complicated with peritonitis or even phlegmon. Perforation is frequent. According to Levy one of the capital symptoms of appendicitis in the sac of an hernia is pain of a sticking and paroxysmal character, always felt with greatest force in the same place. Sometimes there is radiating pain directed from the inner inguinal opening toward the abdominal cavity. The tumor enlarges rapidly. Sometimes there is crepitation. The general manifestations are acceleration of the pulse, and sometimes vomiting, with elevation of temperature. In the gangrenous form the temperature may be low. Levy makes the statement that vomiting is more frequent in simple incarceration of the appendix than in appendicitis. Peritonitis beginning in the herniated appendix may rapidly become phlegmonous. In the differential diagnosis simple incarcerated hernia is first to be excluded. In epityphlitis hernialis as contrasted with strangulated enterocele, the inflammatory phenomena predominate. Vomiting is less frequent, and obstruction of the bowel is not often present, while the general appearance of the patient is not so grave.

The diagnosis is always beset with uncertainties. Bichat observed the possibility of suppurative infection spreading from the epityphlon in situ normale to the hernial sac, and, *vice versa,* from the hernial sac to

the general peritoneum. Bichat reports a case of his own and cites another from Korte in support of this statement.

Hydrocele may exist with hernia of the appendix, and, perforce, with appendicitis hernialis. The wearing of a truss over a herniated appendix is fraught with dangerous consequences. Taxis is to be avoided under all circumstances. Levy observes that the operation is to be determined altogether by the condition in which the appendix is found upon opening the sac. The appendix must be liberally exposed, and resected if possible, and the wound closed so as to cure the hernia. In the presence of phlegmon or suppuration this cannot be done any more than we would close the abdomen after an operation for a suppurative appendicitis. In the presence of phlegmon or suppuration in the hernial sac, drainage must be employed. If an active phlegmon is encountered Levy counsels splitting the appendix and drainage until the sloughing and infection subside, when the clean radical operation is done. Jonathan Hutchinson, Jr., who wrote upon the subject in the British Medical Journal of October 21, 1899, holds about the same opinion.

One of the latest studies of this subject is the thesis of Jacquemin at Paris, 1905. He does not confine his reports to cases of hernia of the appendix alone, but includes all cases of hernia in which the appendix is present. This authority looks upon strangulation of the appendix as being very rare, except where the organ has prolapsed into the canal doubled upon itself. He agrees with all other authorities regarding the influence of old age on hernia of the appendix, but admits that no age is exempt from the accident. He mentions the fact that a hernia with painful crises, or one with an unusual history, ought to be suspected as containing an appendix. He calls attention to Demoulin's two cases of hernia of the appendix com-

plicated with sacculated cysts, giving to the cases the aspect of hydrocele of the cord. He likens appendicitis hernialis to appendicitis in other unusual locations.

The difficulty of diagnosis is increased because appendicitis in a hernia is not very different from what sometimes takes place in an ordinary hernia, strangulated or inflamed. He regards the prognosis as good, except in neglected cases. He tabulates 58 cases with 6 deaths, most of which were due to procrastination. Jacquemin shows how the attendant may be misled by the insidiousness of the onset and the simulation of the disease to epiploitis.

John G. Sheldon published a paper on this subject with a report of a case in American Medicine, October 24, 1903.

Bull and Coley observed the appendix in right inguinal hernia 16 times in 1000 cases.

R. Peterson found the condition twice in 90 right inguinal herniæ. Hutchinson is responsible for the statement that an attack of appendicitis predisposes to hernia of the appendix. He describes certain changes in the organ, due to inflammation, that facilitate its entrance into the inguinal canal. He states that an hernia containing an appendix is usually irreducible, and tender on pressure. If the appendix is found in a normal condition at the operation he advises returning it to the abdominal cavity.

My own case: H. W., German farmer, age 54 years, living near Yates Center, Kas. He had been the subject of an inguinal hernia of the right side for several years. The hernia had often been painful. He had worn a truss. The patient was referred to me for operation by Dr. Maxson, of Toronto, Kansas, August 17, 1907. He entered St. Francis Hospital the same day. According to the statement of the patient he had been ill eight days before, and had called a

physician five days previously. This physician employed taxis persistently, and, failing to reduce the hernia, told him to remain in bed and employ liniments. Three days later, feeling much worse, he summoned Dr. Maxson who recognized the condition and advised operation.

The operation was done on the evening of August 17, the same day of admission to the hospital, and the eighth day after the attack. Inspection revealed a sausage-shaped mass in the right inguinal region extending from the external ring to the testes in the scrotum. Palpation showed the mass to be smooth, hard, and tender on pressure. The tenderness extended to the right iliac fossa. The patient looked sick and was hiccoughing slightly. The bowels were not obstructed.

An incision was made over the tumor, the upper and outer limbs of which corresponded to the Bassini incision for hernia, and the lower part was extended over the cord into the scrotum. Upon opening the sac a small quantity of foul-smelling fluid escaped. The appendix, enormously enlarged and discolored and adherent, constituted the contents of the sac. The walls of the sac were very much thickened and adherent to the cord and the testicle. Upon dissecting up the appendix the head of the cecum and the ileocecal junction formed an infundibuloform projection into the upper part of the canal, so that the entire processus vermiformis lay in the sac. The cecum and the ileum were much discolored and strongly adherent about the entrance to the canal. The appendix was resected close up to the cecum and the sac of the hernia dissected away. The outer and inner parts of the wound were closed, as in the Bassini operation, leaving a small opening over the stump of the appendix for the insertion of a cigarette-drain. The drainage

was removed entirely at the end of a week and the wound healed, and the hernia has remained cured.

J. M. Elder, in the Montreal Medical Journal, of March, 1901, reports the case of an appendicitis hernialis with perforation in an infant seven months old, operated on with recovery.

Baillet of Orleans, France (Revue de Chirurgie, 1904, page 294), reports the case of an infant of thirteen months on whom he operated for appendicitis hernialis with satisfactory result.

Leuret reports a case of appendicitis in the sac of a hernia in a child of three years.

Barth, cited in Jahresbericht for 1902, page 811, reports the case of a woman of 80 years upon whom he operated for gangrenous appendicitis in the sac of a hernia eight days after the onset of the disease.

Frankels (Jahresbericht, 1902, page 811) reports a case of herniated processus vermiformis in which the organ contained a fish-bone penetrating the mucosa.

Estienny (Jahresbericht, 1902, page 811) reports a case.

Dutoit (Jahresbericht, 1902, page 811) reports a case, a woman of 52 years, with partial obstruction and gangrenous appendix with rupture in the hernial sac.

Souligoux, in the same journal, reports a case of appendicitis in congenital hernia with a knuckle of bowel.

Rutherford reports the case of a woman of 79 years with appendicitis in a crural hernia.

Golton reports a case of appendicitis in the canal of a hernia.

Kolliker reports a case of a woman of 69 years with appendicitis hernialis, in Jahresbericht, 1902, page 807.

Mouchet, in Jahresbericht, 1901, page 623, cites a case where an old hernia manifested signs of strangu-

lation which was found to be due to an inflamed appendix present in the sac.

Goebel (Jahresbericht of the same year and page) found perforated appendix in the sac of a hernia. Stechi (Supplemento Al Policlinico, April 14, 1900), reports "a case of appendicitis hernialis."

Calvini (Clinica Chirurgica, 1902, No. 34,) reports a case of appendicitis hernialis with peritonitis, operation and recovery.

Wulff (Jahresbericht, 1902, page 757) and Mires, in the same number and page, report a case each, while Condamin reports two cases.

Racovicieano reports a case in a man of 65, with suppurative orchitis, with appendicitis in the hernial sac.

Quenu (page 599 of Jahresbericht for 1905) reports the case of a woman of 42 in which the appendix was strangulated in a hernia. The portion of the appendix distal to the strangulation was in a state of inflammation; operation and recovery.

Bichat reports a case, cited on the same page, with fatal termination.

I do not believe any of these cases were included in the 116 tabulated by Bajardi and Briancon.

(FOR DISCUSSION SEE PAGE 295.)

THE APPENDIX AS A HERNIAL CONTENT

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CENTERVILLE, IOWA

I desire to submit the clinical report of the following surgical case, illustrating, as it does, the very frequent possibility of encountering difficult and grave complications when undertaking an operative procedure for what is, apparently, but a simple, uncomplicated surgical condition; and this is particularly true when we have to deal with those individuals from whom it is difficult to elicit any tangible case-history, and who, by their environment or personality, are but little given to noticing minor ailments or conditions of personal health, factors so valuable to the diagnostician in formulating his conclusions, for upon the thoroughness of the case-history ofttimes depends the accuracy of the diagnosis.

Mrs. Hannah O., a Swedish widow, aged 77 years. I was called to attend her, March 8, 1907, at 10 P. M., and was informed on arriving that she had an abscess in her right groin, which had been poulticed and was ready to open.

The patient gave the following history: She had enjoyed her usual health until four days previously, when she noticed a painful lump or swelling in the right groin or upper thigh. It had rapidly increased in size and painfulness. There was no preceding minor wound of the toes, foot, or limb; no chill; no vomiting; urination as usual; no bowel movement for two days, but she accounted for this by not having taken any

physic, as was usually necessary. She had never had any similar trouble before, but, on careful inquiry, I learned that she had noticed a small lump at about this point for several years, but she was not certain whether it disappeared when lying down or not.

Examination.—The patient in bed, semirecumbent, and evidencing but little distress. Pulse, 96; temperature, 102°; respiratory and circulatory findings, negative, except arterial changes incident to her advanced age; abdomen not distended and nothing noted indicating an intra-abdominal lesion, except possibly when palpation of the appendix was attempted the patient complained of pain in the right groin, which was, however, apparently due to the tension of the superficial tissues upon a prominent, brawny swelling situated just upon and below Poupart's ligament at about the point of exit of the femoral vessels, and approximately three and one-half to four inches in diameter, irregularly ovoid in shape, indurated and semifluctuant in the center and presenting the characteristic appearance we so frequently observe resulting from a suppurative gland. There was no impulse on coughing, and the mass could not be definitely defined by reason of its gradually merging with the surrounding edematous structures.

On these findings I made the diagnosis of a local suppurative process requiring incision and drainage, and as there was a possibility of this focus of infection being caused by a lesion of a femoral hernia-content, I advised that the patient be removed to the hospital for immediate operation.

The operation was done at Centerville Hospital at 11 P. M. The patient was given a single injection in the spinal canal of ten centigrammes of Stovain solution (Billon's make of Paris). In about five minutes anesthesia up to the costal arch being complete, an incision three and one-half inches long and parallel

to Poupart's ligament, was carefully continued down through the markedly edematous tissue, which rendered dissection and structure-recognition extremely difficult, and while attempting to dissect out the mass intact it was penetrated with an immediate flow of pus and gas with marked fecal odor. This perforation was closed immediately by suture, the operative field redisinfected, and the dissection rapidly continued down until it was proved that the mass continued on through a femoral hernial opening by a thick, dense, fibrous cordlike tissue which was recognized as probably the appendix. The abdomen was opened by a separate incision through the right rectus, when it was found that the cord-like mass passing into the abdomen through the femoral opening was the appendix, and meso-appendix. A loop of ileum, which was incarcerated and adherent, was detached, and on inspection found to be gangrenous and perforated at two points, requiring resection of five inches with end-to-end-suture anastomosis.

The appendix was ligated distally, clamped proximally, severed, and the stump brought out for closure in the usual manner. The intra-abdominal portion, with its attached ligature, was drawn out through the femoral opening, and the opening closed, as in operation for femoral hernia. Both incisions were closed by continuous catgut suture. Time upon operating-table, one hour and a quarter. The patient was conscious throughout the operation, conversed, and suffered no pain. Nothing was administered during the course of the operation except strychnia, 1-40 gr., hyperdermatically, and none following, there being no perceptible shock. Convalescence and recovery were uneventful with the exception of infection of a small part of the lower wound, which united by granulation.

I present specimen from this case, and upon the

accompanying photographs I have indicated the identification straws as follows:

A. Straw passed through the lumen of the appendix.

B. Straw passed through the lumen of the ileum and lower perforations.

C. Straw passed through the lumen of the ileum and upper perforations.

D. Straw passed through the lumen of the ileum.

The points of interest in this case which appeal to me, and are presented to you for your consideration and discussion, are—

First. The unusual amount of pathological conditions present, with the apparently minor clinical symptoms, was made possible by the appendix passing out through the femoral hernial canal, formed either by itself or some other abdominal viscus, dragging with it the meso-appendix. Then circulatory stasis occured, resulting in gangrene with perforation and, by necessity, producing an acute suppurative process in the adjacent tissues and simulating a simple suppurative adenitis.

The perforation and gangrene of the ileum, occurring without intestinal symptoms, was made possible by the fact that but a knuckle of intestine was incarcerated and adherent, but permitting a permeable lumen within the ileum.

By reason of the adhesion of the ileum, appendix, and meso-appendix at the inner femoral hernia, the septic process was extra-peritoneal, hence we had no active peritonitis.

Second. The appendix, constituting a femoral hernial content. This is not necessarily rare, as is shown by the following statistics: Of 250 cases of operation for hernia, reported by Hoffman from the Albert Clinic, Vienna, the appendix was found in the sac 9 times. Of 1,586 cases reported from Prof.

The appendix as a femoral hernial content.

Colzi, Florence, the appendix was present in 27. Wassiljew in 106 Bassini operations reports the appendix present 3 times. Coley in 1,003 operations for the radical cure of hernia found the appendix, either alone or with other viscera, 16 times. Bundschuh, in the Heidelberg clinic, noted the appendix 3 times in 109 consecutive operations for strangulated femoral hernia.

Summing up these statistics we note that the appendix was found as a hernia-content 58 times in 3,054 hernias, or nearly two per cent of the cases.

H. S. Clogg, in the Lancet of October 20, 1906, has collected 53 cases of strangulation of the appendix as a hernial content, and 50 of these were in women, all of which were femoral.

These statistics merely show the occasions on which the appendix has actually been seen, and not the possible relative frequency of the organ in hernial sacs, many of which when operated upon are found empty; therefore it is obvious that the appendix may constitute the hernial content more often than the above statistics indicate.

The appendix herniates because of its location within the abdomen and its free mobility. Unusual length is mentioned in but few instances, hence we must concede that this is not an etiological factor. As a rule, only part of the appendix is herniated, though it is usually the major part. In most cases reported it has constituted the sole hernial content, lies free, not adherent, and when strangulated the meso-appendix shares in the pathological process present.

When the appendix becomes herniated, it is subject to two accidents, the more frequent of which is an inflammation occurring similar to the inflammatory conditions it is liable to when in the abdomen, and the less frequent as shown by the published cases is stran-

gulation by the hernial ring. The possibility of this is even denied by some writers.

(FOR DISCUSSION SEE PAGE 295.)

LYMPHATIC AND PORTAL INFECTIONS FOLLOWING APPENDICITIS, WITH REPORT OF A UNIQUE CASE

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ST. LOUIS, MISSOURI

Lymphatic and portal infections following appendicitis, while rare, still occur with more frequency than is generally believed. They vary in their mode of onset, in the severity of their clinical manifestations and in their ultimate results. It is especially worthy of mention that the degree of infection is not dependent upon the extent of the appendical inflammation and that a mild appendicitis may at times give rise to a severe lymphangitis. It has been further asserted that the lymphatic disturbance may date its origin from an appendicitis occurring many weeks or even months beforehand.

Infection of the veins and lymphatics of the mesentery is of an ascending type, and frequently leads to a subphrenic or hepatic abscess. These complications are late lesions, and rarely occur before the end of the first week. Their clinical manifestations are often very insidious, obscure, and misleading. Generally, the process is a slowly progressive one, but at times it may be fulminating in character. Munroe's observations have led him to believe that persistent fever without other evident causes should suggest one or both of these infections.

Spasm, with tenderness and fullness of the quadratus

lumborum, often indicates a lymphanagitis which may be due to an appendicitis.

In quite a number of cases reported the appendiceal attack seems to have been subsiding when there was a recurrence of fever with sudden and severe pain in the epigastric or right hypochondriac region, accompanied by repeated chills. These chills are usually associated with very high temperature, with profuse sweating and subsidence of the temperature to normal or subnormal.

Jaundice is regarded as a more or less constant symptom. The hepatic enlargement is usually well marked. In a number of cases the condition has been mistaken for malaria, and large doses of quinine have been administered. Concerning the diagnosis of the conditions, Munroe, in a report of more than twenty cases, has very tersely said, that "a persistent temperature, during or following appendicitis, inconsistent with other lesions and associated with lumbar spasm, should suggest a lymphangitis." More or less, perhaps, fleeting jaundice, irregular chills, hepatic tenderness, and progressive emaciation should suggest a portal pyophlebitis following appendicitis, present or remote.

It is worthy of mention that the previous history and a careful consideration of the symptoms presented will usually guide correctly. The mere fact that a patient has recently suffered an attack of appendicitis and that the symptoms have shifted to the hepatic or epigastric region, should lead the medical attendant to suspect hepatic involvement.

In addition to lesions of the liver and diaphragm a number of other remote and distressing conditions may result from portal and lymphatic infections of appendiceal origin. Thus Kelly mentions a general septicemia and an empyema and a localized infection of the mesenteric glands. Coupland cites a case in

which the infection was followed by a parotid bubo and a right empyema. In Sheldon's case there was an infection of the right iliac and femoral veins. The most important of the remote complications following appendiceal attacks are, however, the hepatic and the resultant lesions.

There may be a more or less complete subsidence of the symptoms between the appendicitis and hepatic involvement. In Kelly's instructive case there was a complete absence of the symptoms between the primary attack and invasion of the liver. Three days after the apparent subsidence of the appendiceal inflammation the patient was seized with a severe chill. This was followed by high fever and profuse sweating. A second chill occurred two days later and was followed by the same characteristic temperature and profuse perspiration. Hepatic symptoms appeared, and Kelly operated, draining a large hepatic abscess. The rigors, however, still continued, and his patient died on the thirteenth day.

Weir has reported a case in which a subdiaphragmatic and also a rectal abscess followed an appendicitis attack.

In Symond's instructive case there was a subphrenic abscess, with perforations of the diaphragm and penetration of the lung following a gangrenous appendicitis. The patient was a girl of 16 with an attack of appendicitis of insidious development in which the symptoms became gradually more severe. She was operated upon, on the third day, and a gangrenous appendix found. On the fifth day after the operation the temperature reached 103°, and signs of pneumonia appeared. The liver was enlarged, and jaundice was present. On the sixth day after the operation the patient coughed up foul pus, became cyanosed, and was in a precarious state. Symonds again subjected the patient to an operation. He resected a portion of

the eighth rib in the axillary line, and evacuated a large quantity of pus from a subphrenic abscess. Pneumonia, which had been suspected, was not present and the patient made a good recovery.

The primary pathological changes in the hepatic infections take the form of completely obliterating thrombi, seen in and about the entrance of the portal vein proper or one or the other of its branches. This infection of the portal vein from its tributaries is usually a slowly progressive process, and results in the formation of a more or less septic thrombus. This thrombus, if detached, may lead to general infection of the circulation.

Interesting features of the gross pathology of these conditions are illustrated by two cases reported by Shoemaker. In his first case a post-mortem examination showed inflammatory changes in the connective tissue and veins behind the peritoneum and along a path about two or three inches wide from the root of the mesentery upwards along the front of the spinal column. This area was infiltrated with pus, extended a short distance between the layers of the gastrohepatic omentum, and involved the structure at the transverse fissure of the liver. In the right lobe of the liver an abscess was found.

In Shoemaker's second case the appendix was found to be gangrenous. Behind the peritoneum and extending obliquely upwards from the root of the appendix towards the front of the spine, was an infiltrated area of loose connective tissue and veins, which could be picked up within the abdominal cavity like a section of bowel. This, when cut across, was found to be inflammatory in character. The distended veins within it had thick walls with a dirty-gray lining and contained a grayish fluid. The liver was enlarged and studded throughout with abscesses of various sizes.

In many of the cases reported pus was found in and

around the appendix, but at times remote conditions have existed in which the primary lesion in the appendix was comparatively slight. A case of this kind recently came under my observation, and it presented so many features that I desire to report it.

The patient, E. E., aged 24 years, was seen in consultation with Dr. James Stewart, of this city, to whom I am indebted for the following history: Patient was seized suddenly, June 25, 1907, with symptoms of acute indigestion. The pulse and temperature were normal. Examination, eight hours after the commencement of the attack, showed tenderness and rigidity in the appendiceal region. The temperature was 101°, and the pulse 100. A diagnosis of appendicitis was made at this time, and operation advised. It was, however, impossible to secure the patient's consent to any operative procedure.

During the next few days there was a gradual subsidence of the acute symptoms, although the temperature still remained between 99° and 101°, and the pulse between 90 and 100. Pain in the abdomen continued, more or less severe, and was of a shooting character. Ten days after the onset the patient was seized suddenly with severe pain in the left side of the thorax in the region of the left nipple. The temperature, which had previously ranged between 99° and 100°, rose to 103°, and the pulse to 130. Five days later the liver became markedly tender and enlarged, and more or less transient jaundice appeared. Pain and tenderness were observed at this time in the region of the spleen. On July 22 I saw the patient in consultation with Dr. Stewart. At that time he was pale and emaciated, and had the appearance of being seriously ill. The pulse at this time was 130, temperature 102°, and respiration 34. The record showed that the temperature fluctuated between 100° and 104°, pulse between 116 and 136, and respiration be-

tween 28 and 36. Marked tenderness and muscular rigidity were present in the region of the appendix. The liver was greatly enlarged and decidedly tender on palpation. There was an absence of vocal fremitus over the lower half of the left lung, and percussion over this area was flat. Exploration by aspirator showed that pus was present.

On the following day, July 23d, a portion of the 7th and 8th ribs was excised in the axillary line, and about six ounces of pus evacuated. Rubber drainage was inserted. Improvement of the patient's condition did not follow, as was expected.

On July 28th he suffered from the first definite chill. A few hours later a second chill; the temperature rose to 105°, and the pulse to 140. Profuse sweating and fall of temperature to subnormal followed. From this time on the patient complained of irregular chills, high fever, and sweating. The range of temperature was from 97° to 106°. Emaciation, progressive weakness, with great depression, and dyspnea at times supervened.

On August 5th the chill lasted about one hour. The pulse was 152, and the temperature 107°. The leucocyte count at this time was approximately 15,000. As the symptoms pointed so strongly to the liver as the probable seat of the continued trouble, the patient was again subjected to operation. I made an exploratory incision along the costal border in an endeavor to locate the pus focus. Recent adhesions were found between the liver and the diaphragm, and the exposed surface presented the appearance of an acute hepatitis, but no bogginess could be detected. An exploring-needle was inserted in four different directions, deeply into the surface of the liver, in an endeavor to reach pus, but in this we were not successful. The abdomen was closed without drainage. The rigors continued, and the patient died on August 19th. A post-mortem

examination was made three hours after death. The general peritoneal cavity contained a moderate quantity of slightly turbid serous fluid. Adhesions of recent origin existed between the liver and the diaphragm. The appendix was retrocecal and constricted at one point. It was deeply injected and showed evidence of exacerbation of a chronic inflammation. There were fecal concretions in it. The veins leading from the appendix were injected and appeared as red lines. The liver was greatly enlarged and in the right lobe near the upper surface was an abscess the size of a hen's egg. The veins leading to this area were filled with pus, and many small-sized abscesses were scattered in the adjacent area.

One peculiarity of this infection was that it was limited to one area of the liver. The spleen was typical of a septic process. The right lung was normal, while the left lung was bound down by pleural adhesions. Cultures were made from the liver abscess, blood of the heart, spleen and pus from the left pleura. In the pus from the liver abscess and left empyema the stphylococcus alone was found. In the blood of the heart short chains of streptococci were found, and the bacteriologist who made the examination suggests that the rapidly growing staphylococcus had obscured the streptococci in the liver and the left pleura.

A number of microscopical examinations were made by Dr. Walter Baumgarten, who has made the following report:

At the proximal end the cavity is greatly contracted and the mucosa is much thickened. The submucosa for half the diameter immediately adjacent to the mesentery is densely filtrated with leucocytes, and contains a small area of necrosis near the attached surface, surrounded by a zone of round cells. The remainder of the submucosa is apparently normal. The muscularis and free peritoneal surface are normal in

thickness, and appear normal in all other respects. The cavity of the distal portion is dilated and filled with disintegrated material. The mucosa is flattened to a membrane and composed in many places of a single layer of cuboidal cells; in others it contains a few small glands.

The submucosa is thin, not inflated in any portion. The peritoneum appears normal. Sections of the kidney show wide-spread, cloudy swelling and coagulation. In scattered areas, principally in the pyramids, there is an increase of connective tissue. Sections of the liver show general cloudy swelling. Certain lobules have undergone coagulative neucrosis, some of which show deposits of fat in the cells about the interlobular veins.

The portal spaces are densely infiltrated with leucocytes, and the vein is greatly distended. No bacteria could be recognized in any section.

After thoroughly considering this case I have come to the conclusion that the primary invasion took place directly through the veins, and led to a very rapid general infection.

The prognosis of all portal and lymphatic infection of appendiceal origin must necessarily be very guarded. The insidious development and obscure chain of resulting symptoms is often very puzzling, and in what appears to be favorable cases we may be shocked by the sudden development of grave symptoms.

In cases of pus formation in the liver or beneath the diaphragm drainage may effect a cure, if the process is localized to one area in the form of a circumscribed abscess. On the other hand, if the involvement of the liver is general, with resulting multiple abscesses, we can hardly look for more than a most unfavorable result.

In conclusion, I would add that in the present stage of our surgical knowledge we are almost absolutely

helpless in the presence of some of the severe forms of infection when the infecting organism has once passed into the general circulation. It goes without saying that early removal of the appendix should be the keynote in all cases, together with an attack, wherever possible, upon any pus focus that may form.

DISCUSSION OF THE PAPERS OF DRS. BASHAM, JAMES AND HILL

DR. JOHN P. LORD (Omaha): I have not had a case of inflamed appendix within either the femoral or inguinal canals. I have found the appendix larger, and in one case we had an appendix that contained five bird-shot, which is a little unusual, but it was not what we would call a case of appendicitis.

Some years ago a boy, 12 years of age, was brought to me with the following history: While standing within an open barn door, one of the horses kicked a colt against him, and he fell across the barn door-sill, the colt upon him, and his illness dated from that time. I found he had an abscess over the sacrum and a sinus beneath the border of the gluteus maximus. He was watched for a time, and it was finally decided that he had appendicitis. The history pointed to his having had an attack of appendicitis following this injury.

Operation revealed the fact that the appendix was incarcerated in the great sacrosciatic foramen, and in that position had suppurated.

Many years ago, before we were as prompt in operating for appendicitis as we are now, I had a case of appendicitis in which operation was refused until the man presented very grave symptoms of pyemia. After his death a partial post-mortem examination disclosed that he had an appendicitis, which was undergoing resolution, and he also had a single abscess in the liver, about the size of a hen's egg. There was nothing extraordinary about that. Probably secondary abscess of the liver following appendicitis does not occur as often now as it did when operations were longer delayed.

In this conenction I wish to speak of a visit I once paid to the Academy of Medicine, New York, when Dr. Brewer presented a man on whom he had operated a few weeks before for gangrenous appendicitis. Ten days afterward, he operated on the patient for abscess of the liver. A few days after that he operated successfully, and drained an abscess of the lung. The man was in good condition and was presented to the Academy of Medicine. This was probably an embolic. These infections from the appendix undoubtedly occur sometimes in that way.

But my attention has been called to what I believe to have been an extension through the lymphatics from an appendiceal infection that finally reached the pleura or possibly the lung in a given instance.

About a year ago I was consulted by a general practitioner in Omaha who asked me to explain the presence of a lumbricoid worm which had been brought by the parents of a child upon whom he had operated some time previously for appendiceal abscess, and later for an empyema. This worm had presented itself at the opening in the chest a number of months afterward. The empyema continued, and the question arose as to whether this lumbricoid worm had been generated within the pus cavity. Because of the care which had been given the abscess by the people, the question arose as to whether or not it might not have been infected. In looking into this matter—I cannot quote the authorities now—it was found that worms of that character are not generated outside of their normal habitat, so that, while the inference is strong, it cannot be proven, but I think it is altogether probable, that this worm had found its way through the sinus produced along the posterior chain of lymphatics from the appendix into the chest. I think in practically all of these cases in which the worms find their way into the pleural cavity or through a bronchus they have found their way primarily by the involvement of the lymphatics, and that the discharge finds its way through this course to this unusual location.

Dr. Willard Bartlett (St. Louis): The paper of Dr. Hill deserves discussion in view of one of the very pronounced dangers which accompanies thrombosis of blood-vessels after operation on the appendix, and especially after pus appendix operations. The danger I refer to is pulmonary embolism. One writer of note, who wrote his first great work on appendicitis in the German language, states that in his collection of 500 operative cases, he had 5 per cent of thromboses of blood-vessels somewhere in the vicinity of the operation. Another German authority, an assistant of Professor Kummel, of Hamburg, collected 1,150 consecutive laparotomies, in which there were 4 per cent of thromboses somewhere in the vicinity of the laparotomy wound. In 2 per cent of all laparotomies mentioned fatal pulmonary embolism occurred. Further instances of this same kind may be cited as having occurred in the surgical work of Professor Gussenbauer, the great Viennese surgeon, who died a couple of years ago. He described a picture similar to the one of Dr. Hill, which frequently complicates the reduction of strangulated hernia. He

states that all chest-complications which occur after the reduction of strangulated hernia are to be considered as embolic in nature.

A number of other authorities could be cited in defense of this position, that extreme danger is present wherever thrombosis occurs anywhere in the veins of the abdomen or lower extremity, as it frequently does after appendix operations, especially of the suppurative or infective variety. In my own experience I have just collected twenty-two such cases, ten in my own immediate practice and twelve that occurred in the practice of other physicians. Sixteen cases of thrombosis followed surgical operations, and six occurred in medical or internal diseases. The original thrombus was in various veins. In some cases the pelvic veins, the mesenteric veins, and the veins of the lower extremities following surgical operations; while in the medical cases the original thrombus was in the right heart. In these twenty-two instances a portion of the thrombus went through the right heart, and blocked the main branch of the pulmonary artery in twenty-two cases, with fatal results. In one of these there were only small emboli in the peripheral lung vessels in which the same were giving rise to the same picture that Dr. Hill has described. I do not understand whether he accounts for it in the same way or not.

The subject of pulmonary embolism complicating surgical operations is one which deserves more than a passing notice. It is one which is not given credit for killing patients who die in the neighborhood of six to ten days after operation. The picture may be one of rapid pulse, evidences of shock, gradual unconsciousness coming on, and the time of death varying all the way from almost instant death to death at the expiration of twelve hours.

Dr. J. D. Griffith (Kansas City): I want to say that pulmonary embolism has occurred in two of my cases, with fatal results. It followed in the wake of operative interference in which there seemed to be no other trouble for the first three or four days. The patient seemed to be in a most excellent condition up to the time when it occurred on the fourth day, and then died from pulmonary embolism or thrombosis. I was only able to obtain a post-mortem in one of the cases. In one case I removed the right tube and the appendix. The tube had not leaked, nor was there any leakage into the abdomen. The other was a case of plain appendix trouble, the patient having been operated on in the interval between attacks.

Referring to the colon worms spoken of by Dr. Lord: I have never removed one of them from the appendix, but I have seen them discharged shortly after I operated for appendicitis.

Another point: I have yet to see my first case of acute appendicitis with threatened suppuration or gangrene in which edema over the right crest of the ilium was not a pathognomonic symptom. I have never seen it fail yet.

Dr. J. F. Percy (Galesburg, Ill.): I have never had a case of femoral hernia in which I found the appendix. I have never had a case of inguinal hernia in which I found the appendix incarcerated.

A few weeks ago I operated on a child, 6 years of age, for an indirect inguinal hernia. On opening the bottom of the sac two-thirds of the appendix was found. It was a pathological appendix, with large vessels, and it was clubbed, but whether there was any history of appendicitis I do not know.

I hope it will not be considered out of order if I mention a case of appendicitis occurring in an umbilical hernia which I had some eight years ago. It was the third case of umbilical hernia that occurred in that town that year, and of the two former, the first one died. The symptoms were peristaltic tugging, vomiting, and obstruction; but in doing a Mayo operation I found not only the omentum, but in the center of the omentum a large appendix. On opening the umbilicus the appendix was found inflamed, and was lying in the center of the sac. I have not been able to find in the literature the report of a similar case. I have asked Dr. Basham here whether he has found any reference to cases of this kind, and he said he has not. Dr. James informs me there was a case reported in the November issue of the Annals of Surgery of last year by Dr. Wood, of Philadelphia. I read the Annals of Surgery carefully each month, but must have overlooked it. I will look up the report of this case.

I am greatly interested in the class of cases described by Dr. Hill, because those of us who have had them know what furious cases they are. I have had but one, and that was about five years ago.

A girl, 16 years of age, healthy looking, living in the country, was brought in with appendicitis, and I attempted to bring about a so-called interval condition by following Ochsner's recommendation of starvation and waiting. She had rigidity of the right rectus muscle, pain, and a continuous temperature. I waited nearly two weeks until she had a se-

vere chill and looked very sick. Then I opened the abdomen and removed the appendix, which was not adherent anywhere. It was not very large, but in an extremely pathological condition. In looking in the upper part of the abdomen I saw the omentum fastened to the parietal peritoneum. I closed the abdomen, using a wick-drain, and she did well for a week or ten days, when she had another severe chill, and again looked very sick. I opened the abdomen in the region of the gall-bladder and found the omentum very much infiltrated; and following on up into the liver, because this was involved in a mass, I stuck my finger into the liver and encountered an abscess of that organ. I opened her up freely, and before I knew it I was through the diaphragm, where also I got a great deal of pus. The patient improved for a while, so that I thought she was going to get well, but she developed another chill and had symptoms of pleuritis. I introduced an aspirating-needle into the lower pleural cavity and found pus. I resected nearly all of the lower ribs. The pleura was thickened and in the ordinary condition which we find in cases of empyema. The girl finally recovered. She has a bad-looking abdomen, as you may well imagine, but she is the picture of perfect health at the present time.

In closing, I want to say that Dr. Harris two years ago, in the Journal of the American Medical Association, published a very instructive paper on this subject.

Dr. John C. Morfit (St. Louis): I was interested in the papers relating to the complication of appendicitis with hernia, and I regret I did not have the foresight to bring here a specimen of an appendix in a femoral hernial sac which occurred in my work two years ago, and which was reported in The Inter-State Medical Journal. The patient was a woman, long past the middle period of life, who had pain and evidences of strangulation, but no physician was called for several days. She was finally confined to bed. I saw her and advised operation, which was refused. There was no vomiting, but a perceptible tumor in the right groin, at which point I detected a partially strangulated hernia. The condition of the patient, even though she had been complaining for a week before my visit, was very satisfactory. Operation was refused for several days. She was kept in bed, and ice-bags were applied, and through the mental effect which the gradually growing or enlarging tumor (inguinal) had, she was at last persuaded to undergo an operation. The sac was cut down to, and it looked very much like an ovarian cyst. It was evidently filled with a clear, and not a turbulent, fluid. The

sac was opened and the clear fluid drained out. The sac was large enough to contain my clenched fist, and right in the neck of the sac the appendix was curled up like a little worm. Nothing else was in the sac. The appendix and meso-appendix became adherent around the neck of the femoral hernia. These adhesions were broken up and as much of the appendix pulled out as could be without injuring the ring. The appendix was about six inches in length. It was not perforated. It was wiped dry and pushed back into the abdomen, gauze put in the hernial sac, and the classical incision made above Poupart's ligament, and the appendix removed. There was no inflammation in the appendix, except at the strictured point where it was adherent to the femoral ring. There was not complete strangulation. Infection had not occurred, although there were irritation and probably a slight inflammation. At the radical operation the sac was removed and a radical femoral hernia operation done. The patient made an unusually rapid recovery.

I believe Dr. Murphy about that time, two years ago, reported, in 2,000 cases of appendicitis successfully operated on, two cases in which the appendix was found in the sac of a femoral hernia, and I believe that would represent the frequency with which they are found.

In regard to the paper of Dr. Hill: It has occurred to me that phlebitis does not occur as the result of operation any more than it does as a consequence of non-operative measures, probably not as frequently. It does not occur any more often than pelvic phlebitis or femoral phlebitis occurs in the ordinary labor cases. The cases in which the infection spreads to the portal circulation or to the pulmonary circulation are the exceptions, and I believe are not as likely to occur with operative procedures as with non-operative procedures. Within the past six months one case came into my practice in which a perirenal abscess was diagnosed, and then a gall-bladder condition. The patient was icteric and had been so for a month, was emaciated, and was suffering from sepsis.

In going into the abdomen a very long appendix was found attached in the little sulcus to the outside of the gall-bladder under the liver. It had reached that far up. I believed at the time the case came to operation that the icterus was subsiding, but the tumor was there, although lessening in size gradually. I believe there was there a previous ante-operative portal infection or sepsis which subsided. There was no pus around the appendix, and the inflammation was confined entirely to the portion attached to the liver and

neighborhood of the liver, whereas the proximal half of the appendix was normal. The appendix was removed, and the abdomen closed without drainage. Subsequent to the operation, about ten days afterwards, I had to go in again and let out the pent-up pus, and eventually recovery followed. This is an illustration of the fact that these conditions are uninfluenced by operation, and they are less likely to occur with operative procedures than without them.

DR. W. W. GRANT (Denver): In 1902-03 I made a considerable collection of data which I published in detail regarding the complications and sequelæ of appendicitis, and I called attention to these cases. The concensus of opinion is that pyemic embolic infection of the portal veins is fatal, no matter what you do. And it has seemed to be true that these conditions occur more frequently in connection with gangrenous appendices, without circumscribed abscesses.

SYNCHRONOUS INTRA-UTERINE AND EXTRA-UTERINE PREGNANCY

DAVID C. BROCKMAN, M. D.

OTTUMWA, IOWA

On July 28, 1902, Mrs. L. J., aged 32 years, mother of five children, who were born in rapid succession, was brought to the hospital with the following history: About May 1st, after missing one or two periods, she began having some pain in the pelvis, followed by irregular flowing, fever, and tenderness, which kept her in bed most of the time. About two months ago she suffered very seriously from pain, became faint and vomited; she lost weight rapidly, vomiting frequently, and, in fact, retaining but little food. She came about thirty-five miles to the hospital, and on admission was very much exhausted. Her temperature was 102°; pulse, 130; weight, about ninety pounds.

There was a tumor extending up in the central part of the abdomen, two inches above the umbilicus. It was soft and movable, and fluctuation could be made out through the abdominal walls. This tumor seemed to be much longer and slimmer than a four and a half months pregnant uterus should be.

The pelvis was filled with an undefined, boggy mass, slightly fluctuating on the left side, in which ballottement could be obtained. The cervix was crowded to the front and the right side, and raised very high in

the pelvis, and could be just reached with the examining finger.

Diagnosis.—Intra-uterine and extra-uterine pregnancy of four and a half months duration; ectopic fetus being in the abdominal cavity to the left and behind the uterus. As her condition was so bad from persistent fever and vomiting, we delayed operation for a few days, trying to build her up. In this we did not succeed.

July 31st I opened the abdomen, hoping that I could go into the right of the uterus and do a hysterectomy from the right side, and by shutting off the blood-supply from the uterine arteries, might be able to clean out the ectopic sac without fatal hemorrhage, but to my sorrow I found the entire lower part of the abdomen a mass of adhesions, which bled profusely when any attempt at separation was made. The lower part of the uterus was imbedded in these vascular adhesions, which made it impossible to do anything by this route. Any attempt to open the ectopic sac, would surely have caused fatal hemorrhage. No abscess to account for her fever was discovered, but evidently existed.

The abdomen was closed and I waited for her to gain sufficient strength to try the lower route.

August 19th I opened the vaginal vault and removed a five-months' fetus, which was surrounded by the intestines above and the uterus to the right, the placenta being attached to the uterus and a large area of the intestines. The placenta was much larger than an ordinary placenta of five months. Realizing that it would be impossible to control the hemorrhage from the site of the placenta if removed, I packed the cavity with gauze and waited for the vessels to close. On the fifth day labor pains occurred with hemorrhage. I removed the gauze packing from the sac, hoping thereby to check the abortion, but failed. Profuse hemorrhage occurred both from the sac and the uterus in

spite of firm packing. She succumbed on the second day after the occurrence of labor pains.

In this case the rupture had taken place up through the roof of the tube, allowing the fetus to escape into the free abdominal cavity, where it formed its sac amongst the intestines, the placenta attaching to the unstable tissues absolutely prohibiting its removal without fatal hemorrhage.

In looking back over the case, I do not know what better could have been done, unless I had followed a plan that I shall mention later on in this paper.

In about 135 cases that have been reported, the fatality has been enormous. Before the days of frequent abdominal operations, several cases escaped with their lives by being allowed to go to term, when the ectopic fetus died, and the other one was born alive. In a few cases a uterine abortion was produced, after which the extra fetus was treated by removal or allowed to remain and be absorbed.

I have found no one recommending hysterectomy, as I attempted in this case. Usually the extra fetus has been removed, with, unfortunately, just the results I obtained. The trouble is, such cases occur so infrequently that no observer ever sees more than one, and each one must work without experience. Eight or ten of these cases are reported every year. Sampson, in the "Journal of Obstetrics and Gynecology" of the British Empire, November, 1903, reports 113 cases in detail. In a careful review of the literature, I find about 135 cases reported, but cannot find what percentage were saved; but, as far as I can learn, the percentage of recoveries is very small, especially in recent cases, those reported during the last fifteen years. In fact, if we were to depend entirely upon the reported cases, the recoveries were more numerous before the days of abdominal surgery. But here the statistics are probably at fault, as the favorable cases were far

more likely to be reported than the fatal ones. Of the few cases reported prior to fifty years ago, most of the women recovered under expectant treatment.

The more I consider the matter the more I am impressed with the fact that it is easier to do too much than too little. I believe that an early case should be treated as any other case of ectopic pregnancy; but when seen as late as mine, it would be safer, if the general condition of the patient were good, to destroy the life of the extra fetus in an aseptic manner, and trust that either nature would absorb the contents of the sac or that, if infection occurred, the vessels would be occluded, so that the sac could be opened and drained with the removal of the placenta as soon as it could be detached without serious hemorrhage.

While a hysterectomy from the well side might be done, it would necessarily be a formidable operation; and I now believe much less likely to succeed than the plan I have just outlined.

I trust it may not fall to my lot to look after another of these cases, but if it does and my mind has not changed, I should attempt to inject sufficient morphine into the extra fetus to put it out of commission, and then await results, and meet indications as they arise.

(FOR DISCUSSION SEE PAGE 316.)

THE DIAGNOSIS AND TREATMENT OF EXTRA-UTERINE PREGNANCY

GEORGE C. BARTON, M. D.

MINNEAPOLIS, MINNESOTA

The process of evolution in medicine is nowhere better shown than in the literature of the last twenty years on ectopic pregnancy. In 1888, at a meeting of the American Association of Obstetricians and Gynecologists, Baldy said: "The diagnosis I consider beyond the reach of man, and never expect to see the time when it can be made with certainty and accuracy." Baldy has lived to see the day when the diagnosis can be made in a large percentage of cases, either before rupture, at the time of rupture, or after rupture. That it is possible always to make the diagnosis with certainty I do not believe, for the reason that the cases are not always typical. Women who are normally pregnant do not all present exactly the same symptoms, but in all pregnant women there are certain characteristic phenomena that make a probable diagnosis possible. So with ectopic pregnancy, all cases are not typical, but all cases present features enough in common that a probable diagnosis may be made. In the following case the diagnosis was made by Dr. D. O. Mork, of Hills, Minn., a young man not yet a year in practice.

Mrs. S., an intelligent German woman, forty years of age, had one child nine years old, but since that time had not been pregnant. Some time after her baby was born she had had a trachelorraphy done. She gave

no history of ever having had any pelvic inflammation. She came to consult the doctor on account of a prolapsus. She said she had always been regular until July of this year, when she missed her regular period, which should have been on July 15th. She commenced to flow, however, two weeks later, and this flow had continued more or less all the time up to the time of operation.

About the middle of August she went away on a visit, and while on the train was taken very sick and had severe pain in the abdomen, which she referred to the region of the stomach. She had to leave the train at the first town she came to, and call upon a physician. She believed, and the physician she consulted believed, that the attack was due to something she had eaten. As she put it, she thought she had been poisoned. With this exception she had had no pain. I saw her on October 12th, and on examination found a mass, somewhat fluctuating, on the right side and made the diagnosis, or rather confirmed the diagnosis of Dr. Mork, and advised operation.

On October 14th we opened the abdomen, and found on the right side a cystic ovary and an enlarged tube with closure of the fimbriated extremity. The tube looked dark in color as though it contained blood. It was surrounded by a few fine friable adhesions, which broke up very easily. I removed both tube and ovary without rupturing the tube, and here show you a picture taken by Dr. Corbett of the tube and ovary as it appeared after removal. I then examined the left side, and found a similar condition on this side, except that there was not a cystic ovary. This tube ruptured on taking it out and quite a little dark blood escaped, and some clots. Dr. J. Frank Corbett, of Minneapolis, the pathologist, who examined the specimen for me, reported that in the left tube there was an ectopic pregnancy beyond doubt, although no fetus

was found. The size of this tube would preclude the idea of this being a four-months pregnancy. It would, however, be about what you would expect to see in a two-months tubal pregnancy; so that something took place which arrested the pregnancy in this tube when she had the sick attack in August, probably a partial rupture with hemorrhage into the tube. The right tube was distended with serous fluid mixed with blood. It has been a question in my mind whether this was simply a case of hydrosalpinx. It did not have the microscopic appearance of a hydrosalpinx, nor were the adhesions such as we ordinarily find in a hydrosalpinx. The entire absence of any history of a former pelvic trouble would indicate that this was of recent origin. If so, why should it occur at the time of an ectopic pregnancy on the left side? Is it possible that there was a pregnancy on the right side also, which had terminated at or about the time of the rupture of the left side and that nature had so completely removed all the evidences of the pregnancy? These are questions which have presented themselves to my mind, but I am unable to answer them. It is this that has made the case one of more than ordinary interest.

The diagnosis of ectopic pregnancy should be presented in such manner as to arrest the attention of the busy general practitioner, who has the whole field of medicine before him and is expected to be correct in his diagnosis in all. The patient suffering from an ectopic pregnancy, as a rule, consults her physician for one of two symptoms, some abnormal condition of her menstrual flow or pain, or both. From my own experience, and from what I have gleaned from the literature, I am convinced that irregularity in the menstrual flow is the most constant symptom. In ectopic pregnancy before rupture there is one of three conditions of the menstrual flow:

First, the patient having been regular, misses her

period for one, two, or more weeks and then flows. This flow is not normal either in character or time of its continuance. It may continue as a sort of dribble for weeks, and at no time is as excessive as the flow of a threatened abortion.

Second, there is amenorrhea, which continues until rupture takes place.

Third, there is no change in the menstrual function.

Of these three conditions the first is the most common. Add to this the history of the opportunity to become pregnant with pain, referred to one or the other ovarian regions, and to this add the other symptoms of pregnancy, such as morning-sickness with changes in the breasts, and some of the nervous phenomena common to pregnancy, and the probable diagnosis would be ectopic pregnancy. I think this would be justifiable even in the absence of pain.

In this description, I have not mentioned as an indication the fact that the patient may have gone a number of years without becoming pregnant, for I think this occurs in so small a percentage of cases that it rather misleads than aids in making the diagnosis. If the physical examination now reveals some bluish tinge to the mucous membrane of the vulva and vagina, an enlarged and softened uterus, and an elongated tender semifluctuating mass on one side, with pronounced arterial pulsation in its region, the probable diagnosis can be made positive. If the patient consult her physician with the second condition, that of an amenorrhea for one or two months, she either desires his opinion as to whether he thinks her pregnant, or else it is because she has been having pain in one or the other ovarian region, paroxysmal in nature and described by some as being colicky. If the physical examination revealed the same condition described above then the diagnosis is ectopic preg-

nancy. If the third condition is present, which I believe is rare, the patient consults her physician on account of pain, and here again, if the physical examination reveals a condition similar to that described under the first heading, I believe a diagnosis of ectopic pregnancy is justified.

It may be difficult to make the diagnosis between normal pregnancy with some enlargement of the tube or ovary on one side and an ectopic pregnancy. A careful study of the history will usually reveal whether there has been at any previous time an infection of any kind; also whether or no this pain in the region of the ovary has been of recent origin or of long standing. The fact is that in salpingitis both tubes are nearly always affected and pregnancy is not likely to occur. These points usually clear up the diagnosis.

Pregnancy in a displaced uterus may simulate an ectopic pregnancy. It is usually not difficult to make out a displacement, and replacing the uterus will show the nature of the condition. Pregnancy in a bicornute uterus may baffle our skill in making a diagnosis, but usually some symptom in the vagina or cervix will indicate the nature of the trouble.

In ruptured tubal pregnancy there are the symptoms of pregnancy described above followed by the sudden onset of severe pelvic or abdominal pain, which usually comes on after some exertion, such as lifting or straining at stool, accompanied with evidences of hemorrhage, which is alarming and sometimes fatal. The symptoms of hemorrhage are sudden, acute anemia, weak and rapid heart, dyspnea, sighing respiration, and, it may be, syncope. The temperature is either normal or subnormal. The abdomen is tender to the touch, and vaginal examination reveals an indefinite mass in the pelvis which is extremely tender. If with these symptoms there is found a little flow with the casting off of uterine decidua the diagnosis is plain. A

ruptured pyosalpinx might be mistaken for ruptured ectopic pregnancy, but we have the history of previous infection to guide us. The pulse is not usually so rapid or so weak. The temperature is accelerated from the beginning. Pain is less intense and is continuous, and symptoms of hemorrhage are absent. Hemorrhage into an ovarian cyst may simulate ruptured ectopic pregnancy. A pre-existing tumor, without any of the symptoms of pregnancy and without flow or the casting off of a decidual membrane, will be sufficient to exclude ectopic pregnancy. A pelvic hematocele, the result of a ruptured tubal pregnancy, may not be unlike pelvic peritonitis and cellulitis; but here, again, the history of infection with fever and the feel of a harder mass in the pelvis, with the absence of any of the symptoms of pregnancy or the rupture of an ectopic pregnancy, point to the diagnosis, which can usually be made without trouble. The same thing is true with uterine and ovarian tumors. The history shows the absence of pregnancy or of the rupture of a tubal pregnancy, and the physical examination will reveal a mass sharply circumscribed and mobile, which is unlike that of an hematocele.

To take up the diagnosis of later extra-uterine pregnancy would make my paper too long, so I have confined my discussion to the diagnosis of early cases, as these are much the more important clinically.

The treatment of extra-uterine pregnancy at any stage is surgical, notwithstanding the fact that but a few years ago some of the leading gynecologists were advocating the use of electricity for destroying the fetus. Montgomery, in a paper read at the meeting of the American Association of Obstetricians and Gynecologists, in 1888, said: "While my subsequent study of the subject has not induced me to depreciate the value of surgery, it has caused me to have a higher appreciation than I before held of the possibilities of

treatment by electricity." Electricity in this as in some other gynecological conditions has had its inning, but no longer has a place in the therapeutics of extra-uterine pregnancy.

If the diagnosis of an extra-uterine pregnancy is made before rupture, there can be no question but what the patient should be advised immediately to have the mass removed, this for the reason that so large a percentage of mortality follows in the unoperated cases.

Whether the mass should be removed through an abdominal or a vaginal section, I believe should be left to the individual operator. Personally, I can see no advantage in selecting the vaginal route, and therefore I always select the abdominal.

I do not wish to consume the time of this Association in discussing the technic of the operation. If the patient is seen for the first time at the time of the rupture, the question of when to operate is one that presents itself. On the one side, we have the men who advocate operating immediately, because the chief indication is to stop the hemorrhage, which is endangering the woman's life. On the other hand, we have those entitled to equal consideration who believe it is not for the best interest of the patient to operate upon her during profound shock following rupture. I believe, with the latter class, that with the use of proper judgment in the majority of instances more lives would be saved if we waited for a few hours until the period of shock was over. I have never believed that the condition of shock in which the patient was found was entirely due to the hemorrhage. I believe it is largely due to the severe pain the patient suffers, combined with the fear of dissolution caused by so sudden and violent an attack. I believe this, in the first place, because the shock comes on so soon after the attack that the patient has not had time to have

lost blood enough to put her in the condition in which she is found; in the second place, because we know in other conditions patients suffer profound shock from pain and mental anguish; and, third, because so large a percentage of cases rally from their shock when the pain has been relieved by the use of morphine.

I have been very much interested in the experiments performed by Hunter Robb upon dogs for the purpose of giving us some definite information as to the effects of an abdominal hemorrhage. I am convinced that his conclusions are reasonable and correct. I well remember the statement made to me by Joseph Price at one time when I was at his clinic. He said: "I have just seen a case of ruptured extra-uterine pregnancy. I refused to operate because the patient was in profound shock. I told them that I would not operate now, for if I did she would die, but that she would rally in a few hours, and I would then operate." This statement was made with so much confidence in what he said that I thought he must have good reasons for making it. This is the method I have always followed, and, up to the present time, with no regrets.

While my experience is not as large with these cases as that of some men, yet, in a series of about fifteen cases, I have had no deaths. The practice I have followed when seeing a case of this kind is to immediately give a hypodermic of morphine and atropin. This relieves the pain and quiets the nervous condition of the patient. I have always followed this by a hypodermoclysis of normal salt solution, eight ounces or more, under each breast if necessary. This latter I know is subject to criticism, and yet I do not believe that the objections to its use are based on good and sufficient reasons. If the blood-vessels were rigid tubes then the more poured into them the more will run out, but, instead, they very quickly accommodate themselves to slight variations in the quan-

tity of blood they contain. The effort to bring about a normal fullness of the blood-vessels does not increase the danger of hemorrhage, because it gives a more nearly normal tone to them.

When the patient rallies, the abdomen should be quickly opened and the bleeding stopped by clamping on either side of the mass. The abdomen should then be cleaned out, the mass removed, ligatures applied, the clamps removed, the abdomen filled with normal salt solution, and the abdominal wound closed. If, instead, the patient has not been operated upon at the time of rupture and a hematoma has formed, the symptoms indicating that it had become infected, then a vaginal opening should be made, the clots cleaned out, and drainage introduced.

BIBLIOGRAPHY

"Operative and Expectant Treatment of Extra-Uterine Pregnancy," by Dr. C. S. Foster, Pittsburg, Pa., in the Pennsylvania Medical Journal, January, 1906.

"Ectopic Gestation," by Dr. Henry F. Quackenbos, surgeon to St. Elizabeth's Hospital, New York City, in the Annals of Gynecology, February 7, 1907.

"Two Cases of Extra-Uterine Gestation," by Dr. O. L. Shivers, Marion, Alabama, in the Charlotte Medical Journal, Charlotte, N. C., March, 1907.

"Ectopic Gestation," by Dr. T. A. Stoddard, Pueblo, Colo. The Colorado Medicine, August, 1907.

"Ectopic Gestation, Report of Two Recent Cases," by Dr. G. Scott Towne, Saratoga Springs, N. Y. The Albany Medical Annals, N. Y., February, 1907.

"Ectopic Gestation, Operation and Recovery," by Edgar Hadley, M. D., of Telluride, Colo. The Indiana Medical Journal, May, 1907.

"Ectopic Gestation, With Report of a Case," by Dr. H. C. Holbrook, of Lehi, Utah. The Utah Medical Journal, April, 1907.

"Extra-Uterine Pregnancy: Its Diagnosis and Treatment," by Dr. J. N. Lewis, of Roanoke, Va. The Virginia Medical Semi-Monthly, April, 1906.

"Ectopic Pregnancy, Complicated by Double Intraligamentary Cyst." Case reported by the Brooklyn Gynecological Society, Dr. A. M. Judd. The Brooklyn Medical Journal, Brooklyn, N. Y., January, 1906.

"Ectopic Gestation," by Dr. Hy. F. Quackenbos, New York City. The Annals of Gynecology and Pediatry, January, 1907.

"Primary Abdominal Pregnancy, with Report of Case at Term," by Dr. Edw. T. Hargrave, of Norfolk, Va. The Virginia Medical Semimonthly, October, 1906.

"Report of a Case of Abdominal Pregnancy, by Dr. S. R. Burroughs, of Buffalo, Texas. The Texas State Journal of Medicine, January, 1906.

"A Clinical Review of Some Recent Cases of Tubal Pregnancy," by Dr. S. J. McNamara, gynecologist to Kings County Hospital; obstetrician to St. Mary's Female Hospital. The Brooklyn Medical Journal, December, 1905.

"Tubal Abortion," by Dr. H. C. Coe, of New York City. The Annals of Gynecology and Pediatry, January, 1906.

Report of a Case of Ruptured Tubal Pregnancy, With No Amenorrhea," by Dr. W. Maddren. The Brooklyn Medical Journal, April, 1906.
"Two Unusual Cases of Tubal Pregnancy," by Dr. Chas. H. Dixon, of St. Louis, Mo. The Interstate Medical Journal, February, 1906.
"Appendicitis Resembling Tubal Pregnancy," by Dr. A. Lapthorn Smith, surgeon-in-chief of the Samaritan Hospital for Women, and gynecologist to the Western Hospital and the Montreal Dispensary. The Montreal Medical Journal, March, 1906.
"Thirty-four Cases of Tubal Pregnancy," by Dr. A. Lapthorn Smith, of Montreal. The Montreal Medical Journal, July, 1906.
"A Case of Ectopic Gestation, with Bilateral Suppurative Salpingitis and Adenomyoma of the Uterus," bv Dr. Stephen E. Tracy of Philadelphia, associate gynecologist to the Stetson Hospital. The New York Medical Journal, June, 1906.
"Transactions of the Woman's Hospital Society," reported in the American Journal of Obstetrics, 1905, page 287. Case of Extra-Uterine Pregnancy, reported by Dr. Taft.
"Study of Ectopic Pregnancy, with Report of Twenty-nine Cases," by Dr. Thomas Ashby, Professor of Diseases of Women in the University of Maryland. The International Clinics, Vol. 4, Series 15.
"A Case of Ectopic Gestation, Which Apparently Ruptured Twice," by J. C. Holdich Leicester, late Resident Surgeon to the Eden Hospital, Calcutta. The London Lancet, 1905, Vol. 2, page 1396.
"Case of Double Extra-Uterine Pregnancy," by Dr. H. J. Boldt, Translator of the New York Obstetrical Society. American Journal of Obstetrics, 1906, page 261.
"A Case of Rupture of the Sac in Ectopic Pregnancy," by Dr. John H. Tonking, London, England. The London Lancet, 1906, page 1108.
Forty Cases in the American Journal of Surgery, July, 1907, page 201.
Journal of Obstetricians and Gynecologists, British Empire, 1906; pages 412, 423, 434, 438, 453, 389.
Operative Gynecology.—Howard Kelley.
Text-book of Diseases of Women.—Webster.
Text-book of Diseases of Women.—Hirst.
Diseases of Women.—Skene.
Practical Gynecology.—Montgomery.
Principles and Practice of Gynecology.—Dudley.
Text-book of Gynecology.—Reed.
An American Text-book of Gynecology.—J. M. Baldy.
Text-book of Practical Gynecology.—Gilliam.
Practical Gynecology.—Henry.
Diagnosis of Diseases of Women.—Findley.
The Practice of Gynecology.—Bovee.
Practice of Gynecology.—Ashton.

DISCUSSION OF THE PAPERS OF DRS. BROCKMAN AND BARTON

DR. CLIFFORD U. COLLINS (Peoria, Ill.): The second essayist (Dr. Barton) has very clearly pointed out that the two cardinal symptoms of extra-uterine pregnancy are irregularity of menstruation and pain. Those two things stand out in the history of the cases, but I want to report a case showing that those symptoms cannot always be relied on.

The patient was married in September, 1907. She menstruated on October 23, 1907, and should have menstruated on November 20th; but on November 21st she was seized with pain in the left pelvis. This pain increased. Her physician

communicated with me, and I told him to wait a few days, and that if the pain increased to bring her in. Two weeks from the time the pain began he brought her into the hospital. I found a fluctuating mass in the left pelvis, and this, together with the fact that she had missed a menstrual period and the pain was increasing, led us to make a diagnosis of extra-uterine pregnancy. When the abdomen was opened we found a thin-walled ovarian cyst in the left pelvis partially twisted on its pedicle, with a pregnancy in the uterus. The removal of the cyst relieved the pain, and the pregnancy was not interrupted.

Dr. John P. Lord (Omaha): It is my practice in these cases of ruptured extra-uterine pregnancy to operate on them just as soon as I can arrange for the operation. It is my opinion that the course pursued by the last speaker (Dr. Collins) of waiting will cause him to lose a larger proportion of cases than will be lost if immediate operation is done, and the patient handled judiciously. It has been my experience with those patients who are fainting continually, that we should get them into the Trendelenberg position, by means of a chair upon the kitchen table, perhaps, and begin hypodermoclysis as soon as we see them, while we are busy in getting ready for operation. By the assistant giving saline tranfusion during the time I am operating I have been able to put such patients to bed (who had a pulse of 140) with a full pulse of less than 100. I have operated on them just as quickly as possible. In several of them simply ligating the bleeding point, and perhaps doing little more. Usually these very severe cases, which I have had, have been very early, and rupture has taken place near the cornu of the uterus, so that the pregnancy was not far advanced, and a ligature applied to each end of the tube was sufficient to meet the indications. I have never lost such a case. I have lost cases in which there has been delay for various reasons.

As the doctor's practice and conclusions in regard to treatment are so entirely contrary to mine, I have felt justified in stating my position, and if I am wrong in it, I hope some of you gentlemen will say so, but until I am well convinced that I am in the minority, and until the results of others can be shown to be better, I see no reason for changing my practice of immediate operation in these cases.

Dr. D. W. Basham (Wichita, Kansas): In reference to Dr. Brockman's paper: I simply rise to say that I have had one case of extra-uterine pregnancy complicated with intra-uterine pregnancy. The diagnosis was made by a young man

(Dr. Harry Haskins) in practice at Kingman, Kansas, who, by the way, was educated in this city. He suspected an intra-uterine as well as extra-uterine pregnancy. The extra-uterine pregnancy was ruptured, and the woman was in a bad condition, but notwithstanding her condition we opened the abdomen and removed the extra-uterine pregnancy, and her condition being too serious we stopped, and about ten days later there was expelled the intra-uterine fetus per vias naturales.

In the last eighteen months I have seen four extremely neglected cases of extra-uterine pregnancy. One of them went on for fourteen months, and, I am sorry to say, the case was the wife of a doctor. Apparently, the fetus died about the fourth or the fifth month, but the mass continued to enlarge, that is, the tumor continued to grow through thickening of the walls and by the adhesions contracted with the surrounding viscera. About three or four weeks before the case was brought to operation, this woman was curetted, but finally she made her way to the hospital, where we made an effort to remove, and did remove, the mass, doing a hysterectomy for the purpose of controlling hemorrhage, which was very profuse. In order to make it safer and in order to arrest the hemorrhage, the broad ligaments were clamped before the tumor was touched, and we managed to enucleate the entire mass and control the hemorrhage by packing.

In another case (there were four of them) the fetus seems to have been arrested in its growth or died at about the third or fourth month, and the patient was allowed to go on for eight months. There was more infection in this case than in the one that had gone on longer. Operation was about the same. We employed drainage in both cases. The other two cases were not allowed to go so long. But seeing theses cases impresses one with the conservative forces of nature, and it is wonderful to see what a woman will tolerate.

Dr. George L. Eyster (Rock Island, Ill.): There is one point in the differential diagnosis of this condition which I have not heard brought out by the essayists or by those who have discussed the subject. I refer to an abnormal anatomical pelvic condition that may sometimes complicate very much the diagnosis of extra-uterine pregnancy; and as illustrating it, I would like to detail a case in my own experience.

A woman was brought to me with a history of having missed her menstrual period, and two weeks after she had a severe attack of pain in the right lower abdomen, with collapse. There was a small amount of uterine hemorrhage. She was brought to me a week after that, having had a tempera-

ture of 100° during the week, with some uterine flow. Bimanual examination disclosed a mass in the right side of the pelvis, the uterine body being very plainly palpable to the left of it. My diagnosis was ruptured extra-uterine pregnancy. I opened her abdomen for the relief of it, and found she had a bicornate uterus, pregnant in one side and incarcerated, and held down by rather tight adhesions to the left broad ligament. The incarceration was released, and the patient got well.

This case illustrates a somewhat rare condition, one that can very easily complicate and confuse a physician in his attempt to diagnose it.

Dr. Simon C. Beede (David City, Nebraska): I think until quite recently the teaching has been in the treatment of ruptured extra-uterine pregnancy that immediate operation is imperative. If I am not right I hope the essayist will correct me. I am glad to know that a decided change has taken place. It is not true that the great majority of cases of extra-uterine pregnancy are going to die if we do not immediately tie the bleeding vessel. I think every one knows of a good many cases in which operation was not undertaken, and yet the women did not die. On the other hand, we find very few cases that have come to autopsy on account of the extra-uterine pregnancy rupturing and no operation having been done. The great majority of cases do not come to the operating-table in the hospital when they need this immediate work. They are unfavorably situated in their homes or are miles in the country. I will not take a back seat for anybody in doing emergency operations under unfavorable circumstances, but in view of the fact that the great majority of cases of ruptured extra-uterine pregnancy will get well under proper treatment, that is, rally from shock, when they can be removed to a hospital and operated under favorable circumstances, the sentiment of this Association ought to be, "Don't hurry to operate on these acute cases." Give the patient a full hypodermic of morphia; use salt solution subcutaneously; if the pulse is very rapid, use adrenalin; and in nearly every case the patient will rally, and you will not have the agony of believing that you have contributed to the death unnecessarily of a woman that is already prostrated.

As to the difficulty attending the diagnosis: I saw a case that was operated on by Dr. Boldt for extra-uterine pregnancy which, after opening the abdomen, proved to be an hydatid cyst, with twisted pedicle.

I operated on a case once myself in which I made a diag-

nosis of extra-uterine pregnancy of ten weeks' duration, and found a normally pregnant uterus, with an ordinary ovarian cyst, somewhat inflamed, without any twist of the pedicle or other abnormal condition.

Dr. A. C. Stokes (Omaha, Nebraska): I do not know that I can add anything to what has been said except to cite a case that occurred in connection with my work not long ago which has a bearing on this discussion.

I saw a case in consultation which gave the following history: The woman was in a dentist's chair, and after the dentist had pulled a tooth she felt a severe pain in the abdomen. She fainted away immediately. When I saw her she was in extreme shock and collapse. We made a diagnosis of internal hemorrhage, with the probability of ruptured extra-uterine pregnancy. Operation was recommended, but refused. She died in about six hours after that from hemorrhage. We obtained consent to open her abdomen, and we found that our diagnosis was correct. The abdomen was full of blood. I have always felt that if, at that time, under proper conditions, with proper stimulation, filling the arteries with normal salt solution, I could have operated and stopped that hemorrhage, it would have saved her life.

Dr. O. H. Elbrecht (St. Louis): The most notable work that has been done on the subject of extra-uterine pregnancy in the last two or three years has been done by F. F. Simpson, of Pittsburg, and Hunter Robb, of Cleveland. Dr. Robb read before the American Gynecological Society on the subject a paper that caused a most interesting discussion, and I think we are on the verge of going through the same change of opinion in connection with this subject that we did in appendicitis; that is, the time is coming when a decision must be made as to when is the best time to operate and when shall saline be used.

The previous speakers have cited cases of deaths due to the fact, they think, that they were not operated on. It is important in this connection to know whether saline was used and when. I think it is due to the neglect of not reporting such cases that we are at present in this unsettled stage. There are only too few on record where it was found at autopsy that death was directly the result of hemorrhage from extra-uterine pregnancy, on account of the reluctance in reporting them, and therefore satisfactory data are difficult to obtain.

The question arises, when shall we operate? During shock or shall we wait until shock is over, and shall salt solution ever be used before operation is begun? It looks as

though the time is coming when we shall wait until shock subsides before operating.

Since this subject has been brought to my attention by the authors mentioned, I have looked up the literature at my disposal, more especially hospital reports, for the report of cases of extra-uterine pregnancy in which death can be said to have been directly due to hemorrhage. I can find only a few. Then, again, there is another class of cases that come to us when they have gone on for two or three days or perhaps even several weeks, all hemorrhage having ceased and there are no acute symptoms, and in these a similar question arises, Shall we operate or wait for absorption to take place, and take the chances of infection which is likely to arise? These are the principal points that these papers should aim at.

Dr. John C. Morfit (St. Louis): I want to protest against any such procrastination in cases of ruptured extra-uterine pregnancy. I would just as soon think of waiting in a case of gun-shot wound or stab-wound of the abdomen. There is absolutely no reason that I can see, and the very fact that the patient is in such a condition as to need salt solution is an indication that she needs something more than salt solution, and the only time to operate on these cases is just at the first moment you can catch them in the most favorable condition and circumstances, whether in the country, hospital or what not. The cases that die from operation are half dead before they are operated on. It is procrastination that causes operative mortality. You may drown your patients in salt solution. Suppose that three liters of blood is the maximum in the patient's body; suppose that two quarts of that is lost, and you supply two quarts of salt solution, you do little more than dilute the nourishment that is in the patient's circulation. Have you not seen patients die from starvation of the respiratory centers with a good full saline pulse? I have. I do not think that this or any other association of surgeons should go on record as countenancing any degree of proscrastination in operating on these cases.

Dr. W. W. Grant (Denver): I wish to ask the speakers to bring out the necessity of early operation in these cases. Would Dr. Morfit operate within the first hour when the patient is in what is called "a state of collapse?"

Dr. Morfit: Yes, I would, because in the next hour the patient would be worse than collapsed, and the danger of operation would not be great. The operation can be done under local anesthesia, and it can be done without anesthesia.

Dr. O. H. Elbrecht (St. Louis): From the tenor of Dr.

Morfit's discussion, he evidently believes I advocated the principles mentioned, but I thought I had carefully avoided this, and merely cited the opinions of others, and said I was quite taken up with what had been said by them and in no way committing my present views. I am, however, very glad that Dr. Morfit became so enthusiastic about the remarks.

Dr. W. D. Haines (Cincinnati): I want to correct the opinion expressed that all these patients die of hemorrhage. In the colonial records of the Hamilton County (Ohio) Medical Society, we have eight or nine cases. I posted two of them myself, and the history is that they died within thirty minutes from the time that they perceived pain in the abdomen. An attempt had been made to produce abortion by giving medicines, introducing sounds, etc. These cases both died. One was a music teacher, who was seized by a severe pain in the abdomen while giving a lesson. While sitting on the piano-stool illustrating the exercise to the pupil, she fell over and in thirty minutes was dead. I held a post-mortem on the woman two hours later, and found her abdomen filled with blood and liquid blood. Other cases were reported by my successor, but I am familiar with the reports. They are simple, candid reports, and I do not think any of them have been published.

Given an instance where we are confident that bleeding is going on, I see no reason for temporizing. Would you temporize if the radial or femoral artery was severed? or if you had a ruptured vessel in any place, would you temporize? Would you give the patient saline solution, adrenalin, calcium chloride, or something of that kind? No, gentlemen, there is only one treatment to be given. Of course, we must remember that while we are treating the disease or the injury, we must treat the individual himself. I cast my lot with the man who would put a ligature on a bleeding vessel rather than with the man who would temporize.

Dr. M. L. Harris (Chicago): This subject is one that has been discussed very ardently a number of times. In cases in which the hemorrhage is so great that the patient dies within a few minutes, the chances are we are not able to save their lives by operating under any condition.

We come to two other classes of cases, one in which there is a single hemorrhage, which is so severe that the patient passes into syncope and then will recover. We have a class in which the hemorrhage is repeated. We have a hemorrhage of greater or less amount which stops temporarily, but recurs again. Some of these patients will die within a few days

from recurrent hemorrhage. Now, if we could tell after the first hemorrhage has ceased how many days it is going to be before the next hemorrhage will occur, we should know then how long to wait. It is a fact that it is very rare for this first variety of cases to die from the first hemorrhage. I am excluding those extremely sudden ones which die within a comparatively few minutes. But in the first class, where the patient faints or is in shock from hemorrhage, if we wait a little while until the patient gets over the effects of the shock and do not wait long enough until blood-tension becomes great enough to disturb the blood-clot, which is formed during the faint, then we can operate and save the life of the patient. If we operate in acute collapse, the patient may die. When the patient goes into collapse or syncope hemorrhage ceases, clotting takes place, and there is an interval of safety to the patient. We must consider this period as one of safety, and operate as soon as the patient has got over the immediate effects of the collapse. I do not believe it is a good plan to fill these patients up with salt solution. I do not begin to give salt solution to these patients until I am ready to go into the abdomen. If we fill them up with salt solution, we increase the blood-tension and disturb the blood-clots, which is the patient's safety. We hasten the recurrence of the hemorrhage. I try to operate in this period of safety when I am able to tell it. I use my best judgment to select that time, not immediately during the shock, but after the woman has recovered from shock, but not delaying long enough to get a recurrence of the hemorrhage.

Dr. D. C. Brockman (Ottumwa, Iowa): This subject of extra-uterine pregnancy is a very interesting one. Some of the speakers have been talking about operating on a condition instead of the patient. Let us consider the patients, as well as ruptured extra-uterine pregnancy. Dr. Formad, while coroner of Philadelphia, in the year 1891, made nineteen autopsies on women who had died of ruptured extra-uterine pregnancy from immediate hemorrhage. Death occurred within twenty-four hours from the time of rupture. We do not have these cases now. The younger surgeons do not see these cases the way men used to see them thirty years ago, at which time there was not as much operating as now.

Another thing I want to talk about is this: We are speaking about ruptured extra-uterine pregnancy as though every case, or at least every other case, died from hemorrhage. If the rupture takes place in the abdominal cavity, a large percentage of these patients die. If rupture takes place in the

broad ligament, these patients do not die, as a rule, no matter what you do. Let them alone. If a patient is bleeding to death, stop the hemorrhage, but do not fill her with salt solutiton. Nature is a good doctor, and surgeons should follow the example of nature. The first thing nature does is to lower the blood-tension as fast as she can by making the patient faint. If the patient will lie in a faint long enough, nature will stop the bleeding by blocking or plugging the vessel unless some fool doctor fills the woman up with normal salt solution. If there is any one principle in surgery regarding hemorrhage more important than others it is not to use normal salt solution during active hemorrhage. There is not a better surgical principle than that, and it is as old as normal salt solution. When you are ready to open the abdomen, then have the salt solution ready and be prepared to use it in order to bring pressure up, but not before.

DR. BARTON (closing the discussion): I do not know that I have anything special to add to what I have already said. I wish to thank the gentlemen, however, for discussing my paper. I have set forth the reasons for following the course I adopted. I have said that there were two sides to this question, and in all societies some men are fully as strong and pronounced in their opinions as are others, both taking opposite sides of the question.

I cannot recall the name of the author, but a few years ago there was a report made of a large number of cases of extra-uterine pregnancy in Boston in which the two sides of the question were pointed out, some of the cases having been operated on immediately and others having been allowed to rally, and then operated on; and it was found that the percentage of deaths was very much greater in those cases that were operated on immediately. The exercise of judgment in regard to whether or not to operate on these cases immediately or later is one of the chief things. Dr. Harris' statement elucidates that very well. There is a class of cases in which it is the proper thing to wait. Railroad surgeons do not do now as they used to do, namely, operate upon injured patients while in profound shock. Now they tide them over the shock and then operate.

SEXUAL PERVERSION AS AN ACCOMPANIMENT OF PROSTATIC HYPERTROPHY

JAMES F. PERCY, M. D.

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I am not unmindful or unappreciative of the splendid work already accomplished by the alienist in ferreting out and describing the morbid mental tendencies of all classes of human beings; but I can find no report in the literature of any country that gives a satisfactory explanation of the mental sexual aberration which accompanies the enlarged prostate. This mental condition to which I shall refer occurs only with the development of prostatic hypertrophy in a certain percentage of the sufferers from this condition. I say a certain percentage of the sufferers from this condition, because prostatic hypertrophy may be present in the ordinary forms of senile dementia, and in these the senile dementia would be a rational explanation of the sexual or any other form of mental aberration. In this latter class of cases the prostatic hypertrophy is merely an accompaniment of the dementia, and therefore but a coëxistent condition, and apparently not a cause of the mental symptoms.

Neurologists recognize two forms of senile dementia: the irritable and the apathetic form. "In those patients that belong to the irritable class there is great exaggeration of the emotivity, and this explains why such

patients are intolerant of impressions and of contradictions. They are extremely sensitive and irritable, and the more so because, owing to their great liability to forget things and to commit errors of judgment, they are deficient in the ordinary circumstances of family life. Such effective irritability is kept alive also by their sufferings,—cephalalgia, vertigo, weariness, paresthesia, and other subjective disorders. The nights are passed in sleeplessness, and dream-states are frequent. The subjects are restless and get out of bed. They wander about the house in a dazed condition: they cannot tell what they want, and they are quite out of their reckonings. They show great changeability of humor, sometimes even daily fits of confusion, and they suffer from hallucinatory episodes, with more or less marked agitation." "The apathetic form is characterized by a slow and progressive mental decadence, in which, besides the usual phenomena of amnesia and dysmnesia, there prevails a marked indifference to everything and everybody. This picture corresponds with what is also normally found in certain old men who behold with indifference the ruin of their households and the destruction of their families. Patients belonging to this group enjoy good health, and are as calm as they are vacant. They make no lamentations, and frequently are as satisfied and contented as the gods of Olympus."

In this description, borrowed substantially from a well-known authority (Leonardo Bianchi), we shall recognize types of individuals, both men and women, that we have all seen. But the totality of symptoms given above by the learned author as indicative of senile dementia do not apply as descriptive of the mental state of any of the prostatiques whose history I shall present here. I cannot believe that true senile dementia is anything but progressive. True, its pro-

gress may be held in abeyance by treatment, but that these cases improve to any marked degree or for any length of time, I do not believe. The ordinary forms of dementia which are seen in the average old person, are a degenerative process which involves the textural structure of the whole brain, and this tends to destroy the ordinary elements of thought. The enlarged prostate, in its effects, is a brake which helps to slow down that assembly of functions which, while in their vigor, resist death. Myocarditis, atheroma, arteriosclerosis, and granular kidney, so common in those who are not young, aid in the breaking process. Senile dementia, as I understand it, is not a psychosis; but those who are old are not less free from neurotic tendencies than are the young. One of the commonly recognized causes of neurasthenia in the young male adult is prostatitis; but when that same prostate, or any prostate, has become hypertrophied, and we find the victim of this condition suffering from some form of sexual aberration, the present-day thought has not been to ascribe any relationship between the hypertrophied prostate and the psychosis.

It is, however, the old man who was sexually active before the years piled upon him until his physical energy is about gone, and who yet shows no special mental deterioration, but does begin to manifest sexual symptoms beyond his years, that concerns us in this paper. True, he may apparently be a senile dement, but if, after the partial or complete destruction, by removal or otherwise, of his prostate, his apparent mental perversion disappears and he remains sound mentally, it is difficult to convince one's self that the hypertrophied prostate was not the cause of the erratic sexual wandering. It is my belief that the prostate is the reason for the symptoms in this class, which, from every viewpoint, are most distressing cases; and

that it is another reason for the operative removal of this gland. There is nothing irrational or mysterious about the development of sexual psychosis in the old prostatique when the anatomy, the physiology, and, finally, the pathology of this gland and its environs, are considered. The complete physiology of the prostate is unknown. The same statement can be made regarding the pathology of the prostate gland. The circumstances that are back of what is portrayed as the pathology of this gland are merely the end-findings after the disease has progressed. Pathologists give us no clue as to the causes that initiated the process. It is interesting here to note that freedom from venereal infection is no guarantee of freedom from the plague of the enlarged senile prostate. The just and the unjust are alike afflicted. The anatomy of the prostate is one of the wonders of the human economy, and when its rich nerve-supply through the sympathetic and cerebrospinal nerves—to say nothing of its ducts, glands, and sinuses, or, as Keyes has well put it, "the thousand-mouthed, succulent prostate"—is all considered, is it any wonder that we have a vicious form of neurasthenia in the young when subjects of prostatis, or sexual psychosis in the old when suffering from hypertrophy of this gland?

The life of the aged is the memory of the past. The memory is the growth of nerve-impressions, and a fruitful source of nerve-memories is the sexual apparatus. Is it any wonder that the old man, when plagued by the gradually enlarging prostate, with its pressure, congestion, and obstruction, stirring within him the recollections of other days, should endure mental suffering that is most distressing? Many of these patients are in insane asylums. Many can be found in the government and state soldiers' homes all over the country, as well as in the various county

alms-houses, to say nothing of those to be found in their homes and among their friends. Many of these inmates are plagued by all sorts of sexual phantasms, which lead them into the various revolting practices known to be habitual with some of them. This study rationalizes the pelvic diseases of men where there is a pathological condition that may give the reason for the mental manifestations.

It is possible that a certain proportion of the sexual neurasthenics and sexual perverts may have as an explanation of their mental aberration a pelvic rather than a brain pathology. Certain it is, that an earlier recognition of disease of the prostate and its appendages, with the mental symptoms that may accompany it in the young or old male, would, in a certain proportion of cases, save the pride of the family of the sufferer and prevent the moral health of communities from being undermined. The burning sensation, together with the feeling of fullness and heat in the perineum, will set up an irritation which is expressed through the sympathetic and cerebrospinal systems; and out of this will grow visions and mental vagaries until the old man becomes a prey to all sorts of phantasms that finally make his life a mere sexual fetish. Before the diagnosis of senile dementia is made, and this used as a reason for not instituting surgical measures, I would advise that the case be judged purely from the standpoint of the surgical problems involved, and not from the mental condition. If the patient is physically able to bear the brunt of a prostatectomy, he should be given the benefit of the doubt.

In the three cases that I shall report herewith, the mental condition was restored to normal, sufficient time having elapsed since their operative recovery to permit the making of this statement with confidence. In the case of J. B. D., senile dementia was the rational explanation of the sexual abnormality, but he

entirely recovered, and remained well for five years, when I lost sight of him. This was my first case, but, although more recent, as much can be said of the other two. The diagnosis, then, of the senile dement is uncertain in the presence of active irritation of the prostate, so that it is a reasonable statement to make that, even if the patient is believed to be in the beginning stages of senile dementia, the removal of the prostate will, in a goodly proportion of cases, postpone the progress of the mental failures in a number sufficient to make it a justifiable procedure.

But it is not this doubtful or last-resort class of cases that I have in mind in presenting this subject for your consideration. It is the type of case that is not yet worn out physically, but that has developed an enlarged prostate and with it a psychosis that makes the social and business future, to say nothing of the mental phases of the case, an unpromising one. The patients, if normal, would have a certain number of valuable and comfortable years before them; but they are not normal. Their abnormality, however, is of the character where pathology has invaded normal physiology, and the result is a pathological physiology which in this class of cases results in a disturbed mentality.

J. B. D., aged 75 years, operated on on March 2, 1898. Resection of both vasa deferentia according to White for enlarged prostate. Infiltration anesthesia. In the week of preparation, because of a septic bladder, this patient was discovered leaving notes couched in lascivious terms where they would be found by the nurses. Resection of the vasa in this case was followed by marked improvement in his prostatic troubles, with consequent relief of his bladder symptoms. He was in the hospital two weeks after the operation, and there was no further complaint as to a repetition of the causes which made him obnoxious before the resection of his vasa. He was questioned as to his for-

mer attempts to interest the nurses in his amorous schemes; but could give no clear reason except a distress in the perineum, which kept him stirred up sexually most of the time. I saw this patient frequently for five years after he was in the hospital, and there was no recurrence of his mental wandering, and he expressed himself as satisfied with the improvement in the power to empty his bladder.

My second case was Mr. B., aged 63 years, whom I saw in January, 1897. He was suffering from an abscess of the right lobe of the prostate. His suffering was acute, and the prostration was great. The abscess was incised through the perineum. At the present time the prostate can be palpated as a small mass on the left side, with nothing on the right side. This case is reported, however, because of the change in the moral life after his recovery from his prostatitis. He was always a leader in the religious and business life of the city in which he made his home. He is a man of wealth and engaging personality, and yet before his prostatic abscess changed the morbid current of his sexual activity he had started an undercurrent of breathless scandal because of his sexual relations with negro women. This man is now nearly seventy-four years of age, and I have every reason to believe that he has recovered entirely from his morbid psychic sexual irregularities following his recovery from the prostatic abscess ten years ago. I can also add that his mental condition is still good. He is actively engaged in business, and there are no signs even now of an impending senile dementia.

Case No. 3 is S., aged 74 years. He was operated on in June, 1904. This man was a lawyer who had given part of his professional career to the bench. Disruption of his home was threatened because of his unnatural sexual relations with various members of the lower animal kingdom. The surgical removal

of a very large, juicy prostate restored the mental unbalance of this individual to its normal standard; and now, after three years, he possesses none of the psychical manifestations which made him a horror to his family and former friends.

I have reported these cases because I believe that their consideration from the standpoint of a psychosis is more rational than to class them among the senile dements. If their symptoms are merely psychic, as I believe, then they need not prove less favorable as good surgical risks than if they suffered from any other operable surgical disease.

This subject opens up the very important consideration of the prostate gland from another viewpoint than that of the purely anatomical and pathological. As surgeons, our training has been to consider this gland from only the two viewpoints just mentioned; but I believe that the history of the thyroid gland is to be repeated, in some measure at least, in our future consideration of the prostate. Only a few years ago the thyroid was considered from only its anatomy and pathology; but its physiological importance to-day is receiving greater attention than either its anatomy or pathology. The enlarged prostate, just as the enlarged thyroid, is, in great part, at least, an abnormal physiologic process, and although this statement may convey nothing new, it is true that it has not been, and is not being, accepted by the rank and file of the profession. Teachers, text-books, and writers still consider the prostate from the standpoint of mere morphologic change.

If the three cases above reported teach anything, it is that there is a clinical physiopathology of the prostate which expresses itself chiefly through the cerebrospinal and sympathetic nerves as a functional disease, just as the perverted physiology of the thyroid gland expresses itself through the same system

of nerves with the same results, so far as a mere brain-expression is concerned.

DISCUSSION

Dr. A. C. Stokes (Omaha): This is a very interesting paper. I think, perhaps, we might give a better classification than the author makes in his paper, one which is not quite so indefinite. In the first place, it seems to me, sexual aberrations may be divided into two types: (1) In which sexual desire is too active; (2) in which it is not active enough. The fact is that in almost all of these cases of prostatic hypertrophy, so-called, we may have two problems to deal with: First, the morphological problem in which we have the production of tumors and, second, an inflammatory process. It is not an unknown thing, as you all know, for an old prostatitis to last even to old age, or a prostatitis which began at the age of thirty and continues up to the age of fifty. This may be complicated with the morphological change of senile hypertrophy, and produce the symptoms. Or senile hypertrophy may be the initial condition which arises. In cases in which senile hypertrophy is the initial condition, I have observed that there was obstruction to urination, and that this will arise usually in early inflammation in the posterior urethra which, to a greater or less extent, is almost always present. The sexual changes that are produced are due in most cases to the inflammatory process. This inflammatory process is probably, in all cases, due to some form of infection or other, the infection coming either through the urethra originally or from the urine passing over the prostate gland. If these cases can be traced down and the pathology studied carefully, in most of them that I have seen the real cause of the sexual trouble is an acute or subacute prostatic inflammation, or a better term would be prostatitis, so that we have in connection with senile hypertrophy prostatitis as a complication, causing sexual stimulation and sexual excitement to a greater or less extent in its early history. When this inflammation has continued for a great length of time, then sexual excitement drops off and desire disappears. We may have at a later stage no sexual desire remaining.

Dr. Bransford Lewis (St. Louis): I wish to thank the essayist for his valuable paper, because I regard it as a very interesting contribution, and to me it is new. I have not had any experience along the lines suggested in this paper. I have met with no cases in which there has been abnormal

sexual enthusiasm, so to speak, from prostatic irritation. On the contrary, the major complaint with relation to sexual vitality in my prostatic cases, particularly in some of them, has been that after prostatectomy they have had less ability for intercourse or decreased desire. Now, that has some bearing on the doctor's paper, because there is certainly an intimate relation between sexual vitality and the prostate. However, I have not worked out clearly in my own mind as yet what that relation is. I have had one or two cases of prostatectomy (particularly suprapubic), in which after operation there was greater sexual vigor manifested than before the operation, and in other cases there was a lessened sexual vitality after prostatectomy. I tell these patients that I cannot say in which direction the effect will be manifested, and that no assurances can be given. I will say, however, that in connection with "conservative perineal prostatectomy" I have seen lowered sexual vitality, in which a very careful effort had been made to conserve the ejaculatory ducts, that part of the prostate which, it is claimed, conserves sexual vitality if allowed to remain intact.

As I have said, Dr. Percy has offered a new thought to me, and a valuable one, in that it will serve to explain conditions that otherwise might be mystifying to one who has not met with cases of organic nervous disease—senile dementia, etc., which might be relieved by the removal of the prostate.

Dr. Percy (closing the discussion): Just a word with reference to the remarks made by Dr. Stokes. His classification is contrary to what I have worked out in my own mind in reference to these cases. The most typical case I have seen was the old man who was having intercourse with cows, dogs, etc. That man did not have a painful prostate, but he had a very large prostate, an enormous prostate, which I succeeded in enucleating completely. I am sorry that I did not bring that prostate with me to show you. That man did not have any special form of bladder irritation. He had some obstruction. My experience with the other two cases led me to believe that I got results in this man's case which were satisfactory.

I will say that I got on to this thing accidentally on account of the case of this old man, and it was at a time when we were doing White's resection of the vas deferens. I learned that this old man was leaving notes around, and I wondered if that was natural or a symptom of many of these cases.

With reference to the remarks made by Dr. Lewis, who

says he has not met any of these cases, I will say that these old fellows hide this matter from every one, unless you are very careful to elicit it from them. The young fellow, on the other hand, talks about sexual matters, but the old man does not.

Dr. Lewis makes the statement that some of his patients from whom the prostate has been removed have greater sexual vigor, but it is not an abnormal condition. The psychosis part of it is the part I want to emphasize particularly in contradistinction, because there are a lot of these cases that are being diagnosed as senile dements and are being sent to insane asylums when they can be relieved and made comfortable for many years with a well-planned prostatectomy.

Just one word more with regard to the literature of this subject. I have searched the literature of the world for contributions on this subject, but have failed to find any. The only suggestion I could find was by an Italian author, along the line of neurasthenia. I hope that my observations of these cases may prove to be correct, and that something may come out of it that will relieve these patients, of whom there are many.

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Fairbury
Pritchett, G. L.

Lincoln
McKinnon, A. I.
Mitchell, A. R.

Omaha
Allison, C. C.
Davis, B. B.
Jonas, A. F.
Lord, J. P.
Findley, Palmer
Ross, W. L.
Summers, J. E., Jr.

Plattsmouth
Livingston, T. P.

NORTH DAKOTA

Fargo
Sorkness, Paul

OHIO

Cincinnati
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Ricketts, B. M.

OREGON

Portland
Coffey, R. C.

TENNESSEE

Nashville
Haggard, W. D., Jr.

WASHINGTON

Seattle
Eagleson, J. B.
Jones, Everett O.

WISCONSIN

Green Bay
Minahan, J. R.

Milwaukee
Jobse, Peter H.
Kletzsch, Gustav A.
Levings, A. H.
Mackie, Wm.
Sayle, Robt. G.
Sifton, H. A.
Walbridge, F. E.

Oshkosh
Connell, F. Gregory
Oviatt, Chas. W.

Superior
Ground, Wm. E.

UTAH

Salt Lake City
Baldwin, S. C.
Kerr, Archibald A.
Niles, H. D.

INDEX

PAGE

Abdominal incision, the 161
Anesthesia fatalities in Iowa..... 133
Appendicitis, lymphatic and portal infections following, with report of a unique case..... 287
Appendicitis, the confusion of, with other diseases of the female pelvis 259
Appendix, the, as a hernial content..... 281
Atresia, acquired, of the common duct, due to a gall-stone 47
Baldwin, S. C.
Discussion on surgical treatment of bunion..... 102
Discussion on paralytic club-feet..... 116
Bartlett, William
A common-duct stone larger than any which the author has seen 39
Discussion on preparatory and post-operative treatment 212
Discussion on hernia of the appendix..... 296
Barton, George C.
The diagnosis and treatment of extra-uterine pregnancy 307
Discussion on preparatory and post-operative treatment 210
Basham, David W.
Hernia of the appendix, complicated with appendicitis 273
Discussion on intra-uterine and extra-uterine pregnancy 317
Beede, Simon C.
Discussion on intra-uterine and extra-uterine pregnancy 319
Benjamin, Arthur E.
The confusion of appendicitis with other diseases of the female pelvis 259
Bile-duct, obstruction of the common, with report of a case in which were performed (a) cholecystostomy, (b) partial gastrectomy, with posterior gastro-intestinal anastomosis, (c) cholecystenterostomy and entero-anastomosis 81
Bowers, Charles E.
Discussion on lesions of the viscera..... 185
Discussion on preparatory and post-operative treatment 204

PAGE

Brockman, David C.
Synchronous intra-uterine and extra-uterine pregnancy 303
Discussion on anesthesia fatalities 147
Discussion on intra-uterine and extra-uterine pregnancy 323
Bunion, the surgical treatment of..... 99
Byford, Henry T.
Discussion on anesthesia fatalities..... 148
Discussion on the abdominal incision..... 171
Discussion on lesions of the viscera..... 183
Cancer, an experimental study in the etiology of..... 189
Club-feet, paralytic, arthrodesis and tendon transference in 109
Collins, Clifford U.
The abdominal incision 161
Discussion on intra-uterine and extra-uterine pregnancy 316
Common-duct stone, a, larger than any which the author has seen 39
Connell, F. Gregory
Peptic ulcer of the jejunum..... 63
Cottam, Gilbert G.
The early restoration of function after excision of the elbow-joint in tuberculosis cases..... 105
Davis, Byron B.
The pathological gall-bladder 41
Discussion on anesthesia fatalities..... 149
Dunsmoor, Frederick A.
Discussion on anesthesia fatalities..... 156
Discussion on preparatory and post-operative treatment 208
Duodenal ulcer and gall-stones, the differential diagnosis of 57
Elbow-joint, the early restoration of function after excision of the, in tuberculosis cases..... 105
Elbrecht, O. H.
Discussion on the abdominal incision..... 174
Discussion on intra-uterine and extra-uterine pregnancy 320-321
Eyster, George L.
Discussion on intra-uterine and extra-uterine pregnancy 218
Fairchild, D. S.
Discussion on the abdominal incision..... 174
Gall-bladder, the pathological..... 41
Gall-stones in the common duct, the removal of, through the lesser omentum..... 31
Grant, William W.
Torsion of the omentum 253

PAGE
Discussion on the abdominal incision..... 171
Discussion on preparatory and post-operative treatment 207
Discussion on hernia of the appendix..... 301
Discussion on intra-uterine and extra-uterine pregnancy 321
Griffith, J. D.
Discussion on hydrocephalus 121
Discussion on torsion of the omentum..... 257
Discussion on hernia of the appendix..... 297
Haines, W. D.
The differential diagnosis of duodenal ulcer and gall-stones 57
Discussion on sarcoma of the liver..... 250
Discussion on intra-uterine and extra-uterine pregnancy 322
Hancock, John C.
Acquired atresia of the common duct, due to a gall-stone 47
Harris, Malcolm L.
The removal of gall-stones in the common duct through the lesser omentum 31
Discussion on removal of the humerus..... 98
Discussion on anesthesia fatalities..... 157
Discussion on the etiology of cancer..... 193
Discussion on intra-uterine and extra-uterine pregnancy 322
Hernia of the appendix, complicated with appendicitis... 273
Hertzler, Arthur E.
An experimental study in the etiology of cancer..... 189
Discussion on lesions of the viscera..... 185
Discussion on the etiology of cancer..... 194
Discussion on preparatory and post-operative treatment 212
Hill, Roland
Lymphatic and portal infections following appendicitis, with report of a unique case..... 287
Discussion on removal of the humerus..... 97
Discussion on surgical treatment of bunion..... 102
Discussion on sarcoma of the liver..... 249
Humerus, removal of the whole or part of the..... 93
Hydrocephalus, the surgical treatment of..... 121
Jackson, Jabez N.
Discussion on anesthesia fatalities..... 153
Discussion on preparatory and post-operative treatment 205
James, Charles S.
The appendix as a hernial content..... 281
Discussion on anesthesia fatalities..... 148

PAGE

Jejunum, peptic ulcer of the..... 63
Jepson, William
The surgical treatment of hydrocephalus..... 121
Kerr, Archibald A.
Obstruction of the common bile-duct, with report of a case in which were performed (a) cholecystostomy, (b) partial gastrectomy with posterior gastro-intestinal anastomosis, (c) cholecystenterostomy and entero-anastomosis 81
Knee-joint, the use of Harrington's solution in the treatment of suppurative inflammations of the, with report of an illustrative case..... 87
Knott, Van Buren
Primary sarcoma of the liver..... 215
Lewis, Bransford
Discussion on sexual perversion..... 333
Littig, Lawrence W.
Anesthesia fatalities in Iowa..... 133
Liver, primary sarcoma of the..... 215
Lord, John Prentiss
Arthrodesis and tendon transference in paralytic club-feet 109
Discussion on the abdominal incision..... 172
Discussion on hernia of the appendix..... 295
Discussion on intra-uterine and extra-uterine pregnancy 317
Mayo, Charles H.
The surgical treatment of bunion..... 99
Discussion on diseases of the gall-bladder..... 73
Discussion on the knee-joint..... 90
Discussion on hydrocephalus 131
Discussion on anesthesia fatalities 150
Discussion on the etiology of cancer 193
Discussion on preparatory and post-operative treatment 210
Discussion on sarcoma of the liver 248
Minahan, J. R.
Discussion on anesthesia fatalities..... 151
Moore, James E.
Preparatory and post-operative treatment..... 197
Discussion on gall-bladder disease..... 75
Discussion on anesthesia fatalities..... 152
Morfit, John C.
Discussion on gall-bladder disease..... 76
Discussion on hernia of the appendix..... 299
Discussion on intra-uterine and extra-uterine pregnancy 321
Obstruction, intestinal: exploration..... 269

PAGE
Omentum, torsion of the 253
Oviatt, Charles W.
Some thoughts on surgery as a profession..... 19
Percy, James F.
Sexual perversion as an accompaniment of prostatic hypertrophy 325
Discussion on sarcoma of the liver..... 248
Discussion on hernia of the appendix..... 298
Pregnancy, synchronous intra-uterine and extra-uterine.. 303
Pregnancy, the diagnosis and treatment of extra-uterine.. 307
Ricketts, Benjamin M.
Intestinal obstruction: exploration..... 269
Sala, St. Elmo M.
Removal of the whole or part of the humerus..... 93
Sexual perversion as an accompaniment of prostatic hypertrophy 325
Stokes, A. C.
Discussion on intra-uterine and extra-uterine pregnancy 320
Discussion on sexual perversion 333
Summers, John E.
The use of Harrington's solution in the treatment of suppurative inflammations of the knee-joint, with report of an illustrative case..... 87
Discussion on gall-bladder disease..... 75
Discussion on sarcoma of the liver..... 249
Surgery as a profession, some thoughts on..... 19
Treatment, preparatory and post-operative..... 197
Viscera, the significance of tenderness in locating lesions of the 175
Wallace, C. H.
Discussion on diseases of the gall-bladder..... 74
Discussion on the abdominal incision 173
Witherspoon, Thomas C.
The significance of tenderness in locating lesions of the viscera 175
Discussion on the knee-joint 91